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# FY 2000 Annual Self-Evaluation Report



**Pacific Northwest  
National Laboratory**

Operated by Battelle for the  
U.S. Department of Energy

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*operated by*

BATTELLE

*for the*

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# Pacific Northwest National Laboratory

Operated by Battelle for the  
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October 23, 2000

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OSTI

Mr. Keith Klein, Manager  
U.S. Department of Energy  
Richland Operations Office  
P.O. Box 550  
Richland, Washington 99352

Dear Mr. Klein:

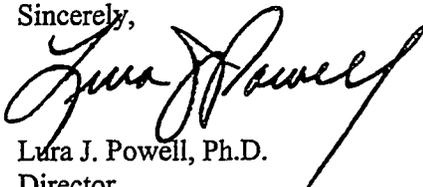
## Pacific Northwest National Laboratory's FY2000 Annual Self-Evaluation Report

Attached is a copy of the Pacific Northwest National Laboratory's FY2000 Annual Self-Evaluation Report. This report summarizes our progress toward accomplishment of the critical outcomes, objectives and performance indicators as delineated in the FY2000 Performance Evaluation & Fee Agreement. It also summarizes our analysis of the results of the FY2000 Peer Reviews, the Division and Directorate annual self-assessments, the implementation of our key operational improvement initiatives and the resolution of the Key Areas for Improvement as identified in our FY1999 Self-Evaluation Report. Together, these provide an indication of Pacific Northwest National Laboratory's Strengths and Areas for Improvement, as well as the maturity of the Integrated Assessment processes used to identify and plan improvements for FY2001.

As you review the report you will find areas of significantly positive progress; you will also note areas where I believe the Laboratory could make improvements. Overall, however, I believe you will be quite pleased to note that we have maintained, or exceeded, the high standards of performance we have set for the Laboratory.

Dr. John LaFemina (375-6806) of my staff is available for questions regarding the attached report.

Sincerely,



Lura J. Powell, Ph.D.  
Director

LJP:JPL:gmh

Enclosure

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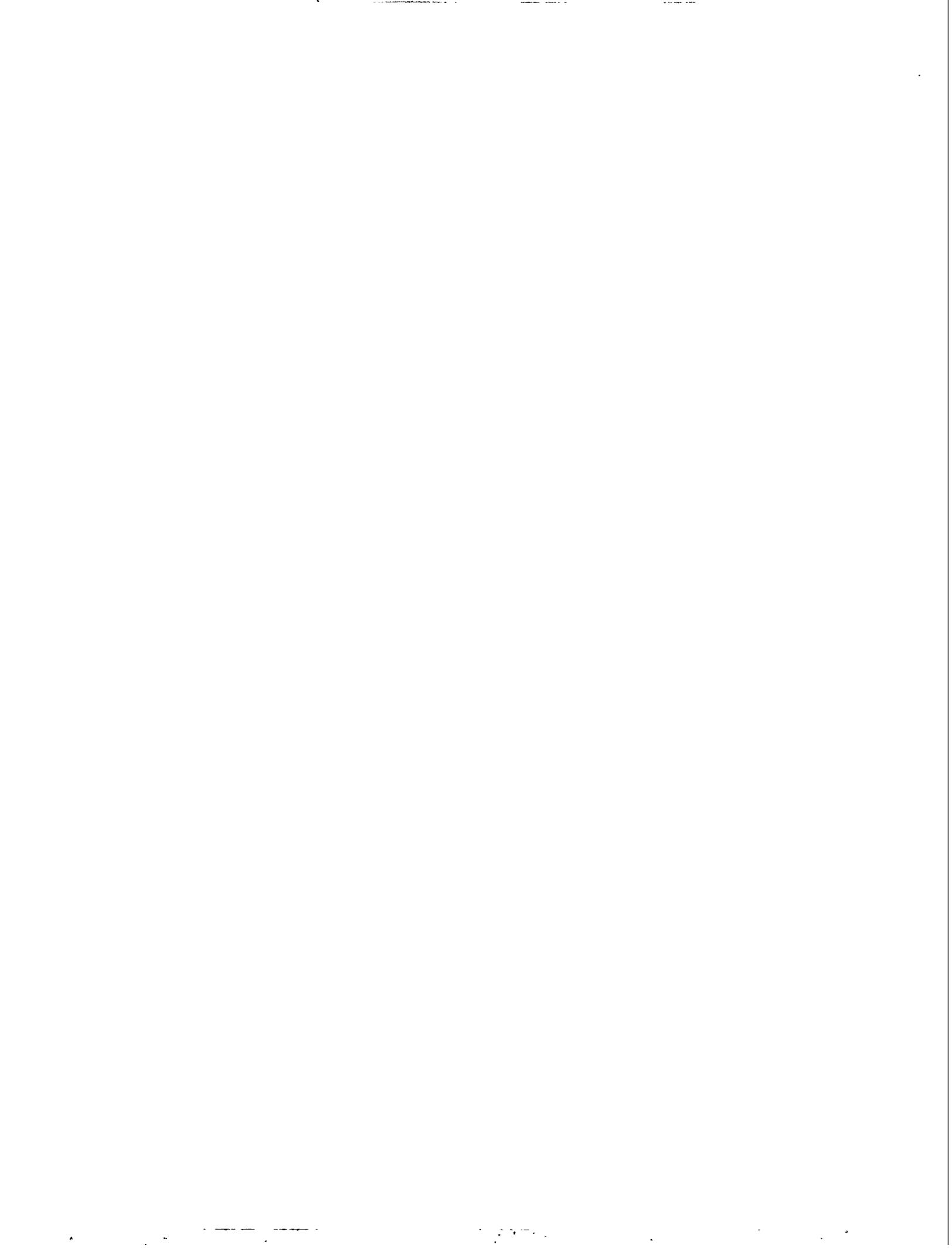
# **FY2000 Annual Self-Evaluation Report for the Pacific Northwest National Laboratory**

**October, 2000**

This document directly supports the DOE-RL Contract for the Management and Operation of the Pacific Northwest National Laboratory Contract DE-AC06-76RLO1830, Appendix E.

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# Executive Summary

Pacific Northwest National Laboratory (PNNL) is designated as a Principal Laboratory for the Environmental Quality mission in the Department of Energy's (DOE's) Strategic Laboratory Mission Plan. In addition, PNNL staff make significant contributions to DOE's missions in basic science, national security, and energy. PNNL intends to be among the world's premier research laboratories, distinguished by scientific excellence and known for solving DOE's most critical and challenging problems, widely recognized for operational excellence, and highly valued by the community and region in which we operate. Evidence of that excellence is provided by continued improvements over the last five years in our scientific and technological efforts, facility operations, environment, safety and health programs, leadership and management processes, and community relations. These improvements have helped PNNL earn the reputation as one of the best-managed national laboratories. We intend to become the benchmark standard of excellence for laboratory management, providing DOE and the nation with the greatest possible research value while fully meeting our responsibilities for the health and safety of our workers and the public, and for protecting the environment.

This self-evaluation report offers a summary of results from FY2000 actions to achieve our strategy and provides an analysis of the state of our self-assessment process. Progress toward our strategy is chronicled through the Laboratory's Critical Outcomes. The DOE's performance evaluation of the Laboratory is also based on our progress against the three Critical Outcomes: Scientific and Technological Excellence, Operational Excellence, and Leadership and Management. These outcomes represent delivery of objective, tangible results to DOE through our performance-based contract. For FY2000, we exceeded DOE's performance expectations for each of the Critical Outcomes.

The result of our integrated planning and assessment process identifies Laboratory strengths and opportunities for improvement. Critical elements of that process are included in this report; namely, a high-level summary of external oversight activities, progress against Operations Improvement Initiatives, and a summary of Laboratory strengths and areas for improvement developed by management from across the Laboratory. While our FY2000 performance was exemplary, opportunities for improvement have been identified. We firmly believe that the ability to recognize areas for improvement as well as strengths is a sign of our overall health and the continuing maturity of our Laboratory processes. Key areas for improvement in FY2001 are highlighted below; detail can be found in Part II of this report.

- Systems Approach to Resource Management
- Information Protection
- Integrated Safety Management Flow-down to the Benchtop
- Cost Management
- Integrated Assessment
- Price Anderson Amendments Act (PAAA) Program
- Travel Risk Mitigation

Overall, based upon the evidence contained in this self-evaluation, the Laboratory's performance for the FY2000 evaluation period has been **Outstanding**. Performance highlights and key issues for each of the Critical Outcomes are summarized below.

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## Scientific and Technological Excellence

The Laboratory is conducting high-quality scientific work that is providing new insights and solutions to key technical issues facing the nation and the world. External peer reviews of major programs indicate we have delivered national and international recognition for excellence in experimental research, for the breadth of our research programs and for staff and facilities of the highest caliber. We are clearly contributing to issues important to the nation.

The Laboratory received significant external recognition in FY2000 including three R&D 100 and three FLC awards. In addition, the quality of our scientific efforts are reflected by the significant list of staff that were recognized for their scientific and engineering excellence in terms of awards, invited talks, and participation on scientific committees.

Our publication rate continues to be strong, though slightly below FY1999 levels. The use of a 3-year rolling average allows us to better account for variability. More noteworthy perhaps is the fact that 33% of the journals we are publishing in are in the top ten for their subject area. Additionally, we have two examples of the relevancy of our work based upon citations. The 1990 paper by Joseph Loo, Charles Edmonds, Charles Barinaga, and Harold Udseth and Richard D. Smith (all with PNNL in 1990) entitled "New Developments in Biochemical Mass Spectrometry: Electrospray Ionization" was recognized this year as the most cited article published in Analytical Chemistry during the 10-year period from 1989 through 1999. Another example is that of William Weber who was recognized by Essential Science Indicators (ESI) as a Highly Cited Author. ESI determined that Dr. Weber has authored 11 papers that have been cited 685 times, placing him among the top 5 most cited researchers of the 1990s in engineering.

Results indicate that we are well positioned to capture new market opportunities or are already beginning to do so in our science mission, consistent with our strategy. This is evidenced by PNNL being named a member of the DOE/OBER Joint Genome Institute, funding for a major new thrust in the proteomics, and growth in our structural genomics program. The EMSL and ARM extended Research Facility continue to represent two national assets as evidenced by user satisfaction, publication productivity, growth and diversity of users, and peer review comments.

Our leadership of the Environmental Management Science Program (EMSP) as well as the Tank Focus Area (TFA) within the Environmental mission area continues to be highly effective. Our support to the Groundwater Vadose Zone project has shown strong improvement over FY1999. The Office of River Protection has been strong while at the same time experiencing several challenges. Additionally, PNNL staff working in close collaboration with Fluor Daniel Hanford developed an expedient, cost-saving approach to stabilizing 1,600 polycubes of degrading plutonium at Hanford. This avoided a costly middle step, reduced work schedule by years, and saved up to \$5 million. This is a noteworthy example of how the environmental mission area responds to critical customer needs.

Our impact in the national security mission area is demonstrated by the leadership we are given over key programs, the levels at DOE to which our staff provide information and the confidence DOE places upon that information, and the consistently positive feedback we receive. One important illustration of our impact is the accuracy of our prediction of the impact of the Y2K rollover on Russian production reactors that was cited as a key accomplishment in FY2000 by our customer. There was significant disagreement within the Intelligence Community (IC) regarding the possible impacts. DOE-IN was confident in PNNL's prediction because of the solid technical base upon which the prediction was based. Other noteworthy illustrations of our performance include: a staff member who served as the official U.S. spokesman on classified

information protection (Information Barriers) in several forums associated with U.S.-Russian negotiations on securing and monitoring fissile materials from dismantled nuclear weapons; the fact that PNNL led the establishment of International Development Centers under the Nuclear Cities Initiative and successfully established centers in the Russian nuclear cities of Zheleznogorsk and Snezhinsk, expediting the downsizing of the Russian nuclear weapons complex; and, through a joint initiative between the University of Washington Henry M. Jackson School of International Studies and the PNNL Pacific Northwest Center for Global Security, and under the auspices of NN-1, the Laboratory signed a Memorandum of Understanding with the University of Washington to establish the Institute for Global and Regional Security Studies and contributed \$100,000 to underwrite the development of curricula and other collaborative activities.

The quality and relevancy of the science and technology delivered in the Energy mission area is illustrated through the role we have played in creation of the Solid-State Energy Conversion Alliance and the continued evolution of the Northwest Alliance for Transportation Technology.

Finally, the Laboratory validated its leadership role by conducting interviews with key DOE programmatic personnel. The outcome of these interviews reflects a high degree of confidence on the part of the customer.

Based on the evidence provided in this self-evaluation, our overall performance rating on this critical outcome is **Outstanding**.

## **Operational Excellence**

PNNL continues to conduct work and operate facilities with distinction and in a manner that is supportive of and integrated with the Laboratory's science and technology mission. We have made significant investments over the past seven years to integrate sound safety and environmental management practices into daily operations. In addition, we have focused on the set of facilities and infrastructure that will be needed to assure that the world-class science and technology produced by PNNL will be supported by world-class facilities and infrastructure.

As a Hanford Site contractor, we actively participated on a joint Hanford contractor review team tasked to provide cost analysis reports to the Hanford Site Management Board (SMB). This team was successful and is a further indication of PNNL's desire to become a strong component of the Hanford site's future.

The Laboratory's performance with respect to occupational safety and health, radiological control, waste management, and environmental protection are strong. We continue to make measurable improvements in most of the eight lagging indicators we monitor monthly. A comparative analysis of OSHA statistics indicated that PNNL's performance is better than the average for other R&D organizations. Staff continue to perform very well with respect to the OSHA indicators for Lost Workday Case Rate, Total Recordable Case Rate, and Lost Workday Incident Rate.

An internal investigation of waste management activities in the 331 facility resulted in the discovery of four missing waste containers. The missing waste containers consisted of approximately 2.5 gallons of waste, 80% of which was water. This event was reviewed by the DOE IG, the Washington State Department of Ecology (WDOE) and EPA Region X Criminal Division and was documented in ORPS reports. During the review it was determined that the PNNL hazardous waste management processes meet regulatory requirements. As part of our corrective actions

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and the lessons learned from this review we have implemented improvements to our waste management self-assessment process. To date, Ecology has taken no action, and has indicated a willingness to review the facts and issue a closure letter. Battelle made a proactive call to the Tri-City Herald after the final ORPS report was placed in the DOE Reading Room. The Herald ran a story on the missing waste containers in late September. The story has not generated any additional public or regulator interest. Although a serious incident, this demonstrates the Laboratory's ability to effectively manage events that could have significant regulatory and/or public impact.

Performance against the Facility management system Memoranda of Understanding (MOUs) with our DOE-RL counterparts resulted in increased emphasis on the effective and efficient delivery of products and services to Laboratory staff. Noteworthy accomplishments among the Facility management systems included the Emergency Preparedness (EP) management system receiving high marks from DOE-RL for Exercise "Bold Endeavor." In addition, the Facility Acquisition and Disposition (FAD) management system completed Building Life Cycle Plans (BLCP), including Condition Assessments for 16 facilities. The completed condition assessments covered 65% of all buildings and represent 85% to 90% of the content of the Building Life Cycle Planning document. This effort represents significant progress towards improving the level of maturity for evaluating facilities and their life cycle needs. Staff use of the Standards Based Management System continues to increase-up 7% over FY1999 - but the rate of increase has flattened somewhat. In addition, the number of SBMS subject areas appears to be decreasing as we consolidate to reduce redundancy.

PNNL reported a security incident in July 2000 that occurred during the Site wide Hanford Fire emergency. Following consultation with DOE-RL PNNL initiated a security stand-down in response to this incident involving the control and protection of a classified document. The stand-down was initiated to ensure that the Laboratory fully maintains our capability to conduct classified work to the highest standards. A team of senior staff from across the Laboratory was formed to examine the status of the Laboratory's classified work, develop lessons learned, and determine the actions necessary to formalize restart criteria. The multiple actions taken during the stand-down included reinforcement of the awareness of all staff and management, strengthening the Roles, Responsibilities, Accountabilities, and Authority (R2A2s) associated with classified work, emphasizing the reporting process for such incidents, and sharing lessons learned. The implementation of these actions revealed several additional opportunities for improvement. Completion of the actions will help to assure that classified work activities continue to be conducted in a manner that not only meets all security objectives but also enhances our ability to achieve program objectives.

The completion and issuance of the FY2000 Facility and Infrastructure Strategic Plan on December 30, 1999, reflected a significant improvement over previous plans primarily due to extensive partnering between the Facilities Directorate and all research divisions. The plan also improved alignment with facility and infrastructure needs and the strategic direction of research initiatives and served to enhance our focus on developing and maintaining the facilities and infrastructure that will carry PNNL into the 21<sup>st</sup> Century. PNNL completed the Limited Areas Island (LAI) facility modifications to the EESB building according to schedule, however, based on the request and the benefits to be realized, we delayed the moves necessary to activate the LAI phase 2. This action was intentionally delayed by PNNL to permit the acquisition of additional office space. Additionally, the completion of the OC3 System Upgrade, a milestone of great strategic significance for the research missions of the Laboratory, will not be realized until early FY2001. The completion of the milestone was delayed due to conflicts between service providers which

were second tier subcontractors to PNNL but which PNNL did not have direct control over. The delays encountered have detracted from the overall schedule performance however, the actions initiated by PNNL demonstrated leadership towards achieving the higher strategic value.

Based on the evidence provided in this self-evaluation, our overall performance rating on this critical outcome is **Outstanding**.

## **Leadership and Management**

Battelle leaders and managers are making a difference within the DOE complex, Pacific Northwest National Laboratory and the community. We are developing world-class leaders, infrastructure and management systems to help drive our strategic goal of becoming the benchmark standard for Laboratory management. At the same time, our efforts to stimulate the regional economy by assisting in the attraction or start-up of new businesses and through technical assistances are bearing positive fruit.

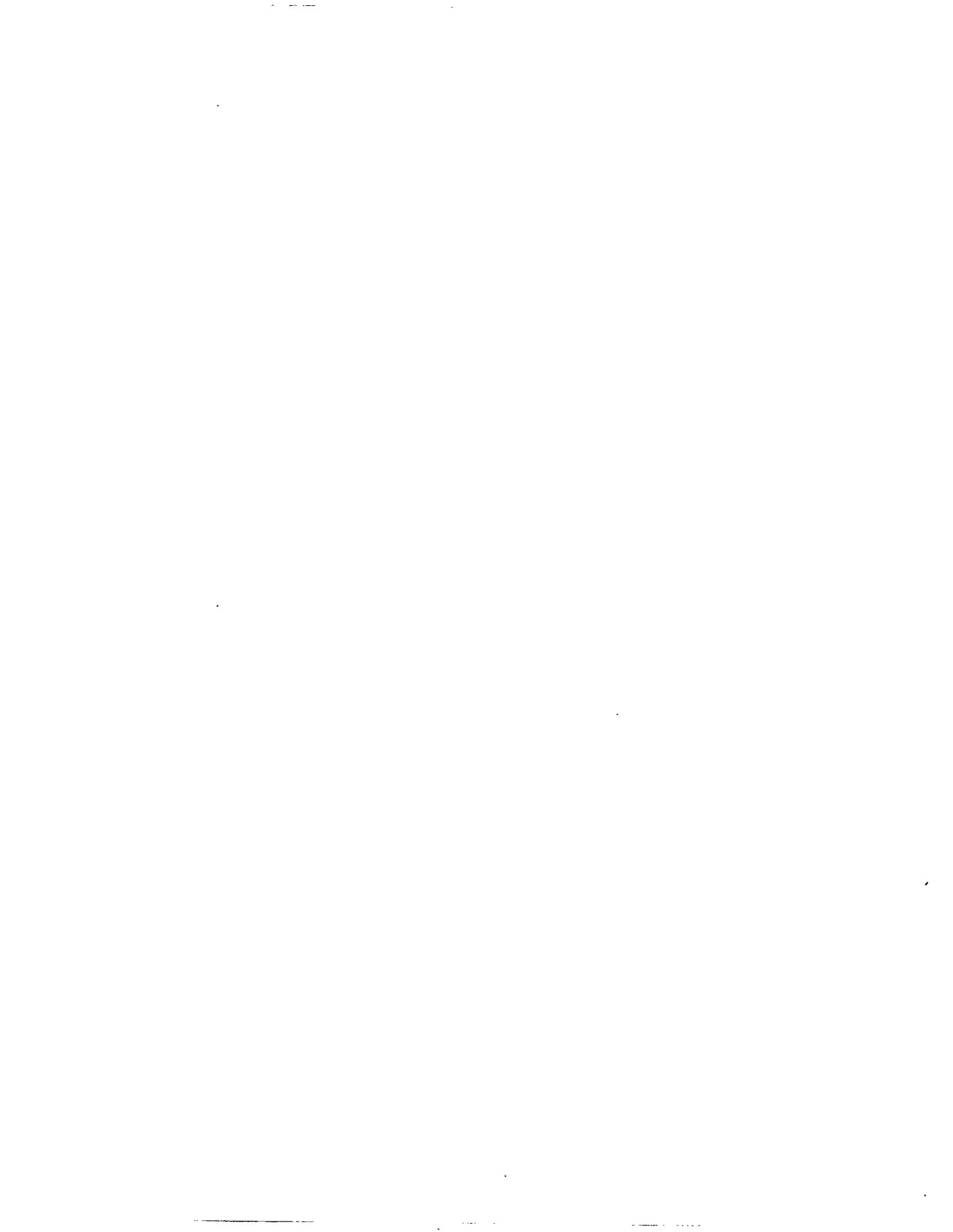
Our Integrated Assessment Management System, the model for a number of systems being used by other national laboratories, continued to mature. The Information and Analysis portion of our self-assessment program, a key component of the Integrated Assessment Management System, was evaluated by an independent subject matter expert and was judged to be what a typical Baldrige Award winner would score in the area of Measurement of Organizational Performance (60%). As expected however, the program was rated as being in the beginning stages of Analysis of Organizational Performance (20%). The identification of a number of areas for improvement will allow us to focus efforts for significant improvement in FY2001.

The Laboratory continues to develop and maintain a strong cadre of scientific, engineering and management leaders. As a result of our strong succession planning and external recruitment programs, thirty-two (32) key and strategic positions were filled by a combination of succession planning (50%) and external hiring (50%). Our vigilance at developing and bringing in key staff has eliminated concerns about a possible 'brain-drain' at PNNL as Battelle placed qualified leaders, managers and scientists at other Battelle-affiliated national laboratories.

We are helping create a diversified economy by putting technology to work in the Tri-Cities region. In FY2000 we launched, or helped launch, 10 new businesses and we provided technical assistance to 55 additional businesses, in a year where programmatic funds dried up and additional sources needed to be identified. Ninety-one percent (91%) of the technical assistance recipients surveyed indicated that they were satisfied or better with the utility of the assistance provided and with the interaction process, providing solid feedback that our technical assistance program is delivering what the customer needs.

The Laboratory continues to be an extremely strong influence concerning the enhancement of science and mathematics education. Eighty-four (84) teachers participated in four Laboratory-sponsored projects for teachers of science, mathematics, and technology in FY2000. Of those who completed and returned evaluations, 86.8% (66 teachers) rated the programs at sums of 10 or higher on a slide of 1-12.

Based on the evidence provided in this self-evaluation, our overall performance rating on this critical outcome is **Outstanding**.



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# Introduction

The Laboratory's goal for the FY2000 Self-Evaluation is to provide a critical review of our progress toward accomplishing the Critical Outcomes and to evaluate the quality of the management systems the Laboratory uses to drive continuous improvement.

Building upon the framework established in FY1996 and improved upon each year since, this year's Self-Evaluation Report presents a focused, quantitative and objective approach to evaluating the performance of the Laboratory. It is based on the Laboratory's performance toward achieving a set of Critical Outcomes, objectives and performance indicators that were developed in partnership with our key customers.

To ensure our long-term ability to provide high-value products and services to our U.S. Department of Energy (DOE) customer, the Laboratory, in partnership with our DOE customer, evaluated both its long-term needs and the current operating environment to develop the set of Critical Outcomes. The Laboratory's FY2000 Critical Outcomes serve as a basis for the overall management and measurement of performance within the Laboratory. Each outcome is supported by two or more objectives. Progress toward each objective is measured by performance against a specific set of performance indicators. The results of progress toward the Critical Outcomes as documented in Part I of this report are also used to provide DOE-RL with a measurement system by which Laboratory performance can be evaluated.

The Laboratory's FY2000 performance rating can be determined by evaluating progress against agreed-to individual performance indicators and rolling the results up to the Objective, Critical Outcome, and Laboratory levels.

The Laboratory views self-assessment as the mechanism to determine if organizational and personal objectives are being accomplished and in the manner expected. Self-assessment has always been part of the Laboratory's management approach. However, determining where our Strengths lie, continuously identifying and acting upon Areas for Improvement, and a continually maturing self-assessment effort are the keys to sustaining and improving the overall performance of the Laboratory. Each Division and Directorate is required to perform an annual self-assessment and to document the results of that assessment. A summary of the Laboratory-level Strengths and Areas for Improvement, gleaned from the Division's and Directorate's self-assessment reports, and other associated performance reports, is provided as Part II of this document.

Part III of this report provides a summary Assessment of the Continued Maturity of the PNNL Self-Assessment Program.

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# **Part I**

## **Status of Performance Against the Critical Outcomes**





# 1.0 Scientific & Technological Excellence

Pacific Northwest National Laboratory intends to be the most relevant and productive supplier of science and technology, focused around our environmental science and technology mission, and with significant contributions in our energy, national security, and health work.

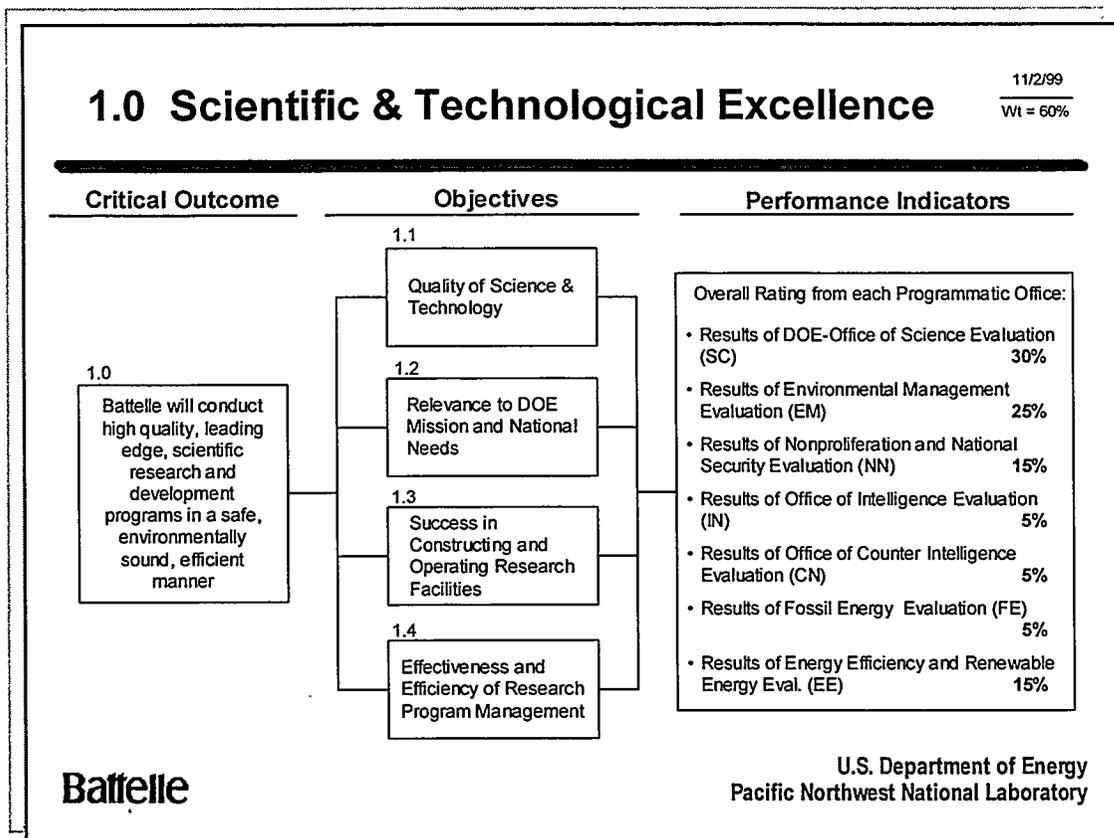
We continue to strengthen the scientific core of the Laboratory, improving both the quality and scientific impact of our basic research programs and strengthening their ties to outcomes important to DOE, Congress, and the public.

We continue to place emphasis on partnerships for scientific research and education. We continue to increase the fraction of our research that is carried out in partnership with the university community as well as provide research participation opportunities to visiting students.

Finally, we seek to manage and operate our research and user facilities, as well as our research programs, with distinction.

For these reasons, and in partnership with DOE, the Laboratory has established the following Critical Outcome, objectives and performance indicators to guide our efforts and to monitor our progress.

The Scientific & Technological Excellence Critical Outcome Tree, detailing the Critical Outcome and its' supporting Objectives and Performance Indicators, is presented below.



## Summary

The Laboratory is clearly conducting high-quality and highly relevant scientific research and development programs that are providing new insights and solutions to key technical issues facing the nation and the world. Customers consistently rate our performance high indicating that we are delivering value. External peer reviews of major programs recognized our programs as achieving national and international recognition for excellence in experimental research, for the breadth of our research programs, and as having staff and facilities of the highest caliber. The relevance of our work is further indicated by our outstanding success rate in capturing new programs and critical proposals for new work.

The recognition we receive provides further evidence of our impact. The Laboratory received significant external recognition in FY2000 including three Research and Development (R&D) 100 and three Federal Laboratory Consortium (FLC) awards. In addition, the quality and relevancy of our scientific efforts are reflected by the breadth of staff that were recognized for their scientific and engineering excellence in terms of awards, invited talks, and participation on scientific committees. Our publication rate continued to be strong in FY2000 and we saw evidence of the relevancy of our work by the number of times we are cited.

Results indicate that we are well positioned to capture new market opportunities or are already beginning to do so in our science mission, consistent with our strategy. This is evidenced by PNNL being named a member of the DOE/OBER Joint Genome Institute, acquisition of the Proteomics program, and acquisition of a major program in structural genomics. The EMSL and ARM extended Research Facility continue to represent two national assets as evidenced by user satisfaction, publication productivity, growth and diversity of users, and peer review comments.

Our leadership of the Environmental Management Science Program (EMSP) as well as the Tank Focus Area (TFA) within the Environmental mission area continues to be highly effective. Our support to the Groundwater Vadose Zone project has shown strong improvement over FY1999. The Office of River Protection has been strong while at the same time experiencing several challenges. Additionally, PNNL staff working in close collaboration with Fluor Daniel Hanford developed an expedient, cost-saving approach to stabilizing 1,600 polycubes of degrading plutonium at Hanford. This avoided a costly middle step, reduced work schedule by years, and saved up to \$5 million. This is a noteworthy example of how the environmental mission area responds to critical customer needs.

Our impact in the national security mission area is demonstrated by the leadership we are given over key programs, the levels at DOE with which our staff provide information and the confidence DOE places upon that information, and the consistently positive feedback we receive. One important illustration of our impact is the accuracy of our prediction of the impact of the Y2K rollover on Russian production reactors that was cited as a key accomplishment in FY2000 by our customer. There was significant disagreement within the Intelligence Community (IC) regarding the possible impacts. DOE-IN was confident in PNNL's prediction because of the solid technical base upon which the prediction was based. Other noteworthy illustrations of our performance include: a staff member who served as the official U.S. spokesman on classified information protection (Information Barriers) in several forums associated with U.S.-Russian negotiations on securing and monitoring fissile materials from dismantled nuclear weapons; the fact that PNNL led the establishment of International Development Centers under the Nuclear Cities Initiative and successfully established centers in the Russian nuclear cities of Zheleznogorsk and Snezhinsk, expediting the downsizing of the Russian nuclear weapons complex; and, through a joint initiative between the University of Washington Henry M. Jackson School of International

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Studies and the PNNL Pacific Northwest Center for Global Security, and under the auspices of NN-1, the Laboratory signed a Memorandum of Understanding with the University of Washington to establish the Institute for Global and Regional Security Studies and contributed \$100,000 to underwrite the development of curricula and other collaborative activities.

The quality and relevancy of the science and technology delivered in the Energy mission area is illustrated through the role we have played in creation of the Solid-State Energy Conversion Alliance and the continued evolution of the Northwest Alliance for Transportation Technology.

Finally, the Laboratory validated its leadership role by conducting interviews with key DOE programmatic personnel. The outcome of these interviews reflects a high degree of confidence in our leadership on the part of the customer.

Based on the evidence provided in this self-evaluation, our overall performance rating on this critical outcome is **Outstanding**.

## **Science and Health Mission**

Many of the indicators we use to determine our level of performance and predict how our customer will view our performance transcend one or more of the four key objectives identified in the Performance Evaluation and Fee Agreement. For that reason, our results are presented instead in sections. Each section title describes, to the degree possible, the key objective or objectives to which the indicators correlate. For example, 1.1 below provides results that allow us to understand both the *quality* and *relevancy* of our work.

### **Office of Science (DOE-SC)**

The continued progress noted by peer reviews, recognition performance, publications, and the academic/scientific partnerships reflect the overall quality and relevancy of our science. Results indicate that we are well positioned to capture new market opportunities or are already beginning to do so in our science mission, consistent with our strategy. This is evidenced by PNNL being named a member of the DOE/OBER Joint Genome Institute, acquisition of the Proteomics program, and acquisition of a major program in structural genomics. We continue to demonstrate strong stewardship for the EMSL user facility, for the day to day operation of ARM, and are gaining momentum in the newly established distributed research center that we are a collaborative partner on. We are also continuing to enhance G-1 Aircraft operations. Although we have not yet received formal feedback on our leadership in Fundamental Science, we expect our performance to be similar to that of FY1999.

Based on the objectives and supporting indicators that support this outcome, we believe our FY2000 rating is **Outstanding**.

#### **1.1 Quality and Relevance of Science and Technology to DOE Mission and Needs**

##### **Results**

Peer reviews represent one of the most profound indications of the caliber of our scientific and technological performance. Results from our peer review endeavors indicate that we have staff and facilities of the highest caliber, that our work is recognized nationally and internationally, and

that we are contributing to issues important to the nation. The relevance of our work is further indicated by our outstanding success rate in capturing new programs and critical proposals for new work. Progress is further supported by the diverse recognition that we sustain at the state, regional, national and international levels. Furthermore, our strong performance in R&D100 and FLC competitions indicate that we are effective in the development and transfer of relevant technology. Our publications, which are an important mechanism for sharing new knowledge with the national and international community, are in line with aspirations. Finally, we continue to increase our academic partnerships, which enable the flow of new ideas, as well as high quality science and engineering staff into the laboratory, thus contributing to our continued success.

Based upon the performance indicators that support our objectives of delivering high quality and highly relevant science and technology, our rating for FY2000 is **Outstanding**.

## Analysis

**Results of Peer Reviews:** The following are the primary components of the Laboratory's peer review process:

- The Laboratory Review Committee (LRC) is composed of chairs of the Division Review Committees (DRCs). This committee reports to the Laboratory Director.
- The Division Review Committees (DRCs) ensure proper peer review of major programs/projects, product lines, core technical capabilities, and technologies. The reviews cover Division activities on a three-year rotating basis so that all work is reviewed at least once every three years.
- External Reviews are performed on specific PNNL research programs.

The summary results of these reviews, across all mission areas, are provided in Appendix A.

## LRC Review

The LRC met on September 11, 2000. The LRC provided useful information regarding what they viewed to be strengths as well as areas for improvement or focus in FY2001 (see Appendix A). The LRC also complimented our responsiveness to previous issues that have been raised.

The following issues were highlighted by the LRC for our Science and Health Mission area:

1. Equipment upgrades are critical for EMSL to remain a forefront user facility. The Laboratory should strengthen efforts in nanosciences to promote these capabilities and facilities and position the Laboratory for the national initiative.
2. Health Sciences. There is a clear lack of critical mass in personnel, space, and equipment in the biology portfolio. The Laboratory needs to focus considerable effort in this area to attract high-level researchers. There is a real need for significant laboratory renovations in 331. A strong university partner in biology would give the Laboratory needed recognition in this competitive area.
3. Recruiting and retention of high quality staff. At higher levels in particular it is hard to compete.
4. Organizational Structure of Division and how it fits into the overall structure of the Laboratory. How do resources impact the Laboratory agenda? Fragmentation of materials research. Integration of statistics group.

5. Meeting Format. More interactive and longer (2 days instead of 1.5) in order to cover material sufficiently. One potential format would be to have the person in charge of the technical area being reviewed give an overview to show how everything fits together at the group or department or research focus level and brief synopses of the different projects in the group. This would be followed by a poster session where reviewers can talk and interact with specific researchers at the project level.

### DRC Review

**Review Scope:** The review was held May 22-23, 2000. Components of the review included Nanoscience, Toxicology and Chemical Dosimetry, Statistics, and Education & University Relations.

**General Comments:** Nanoscience and Education & University Relations were rated outstanding, and Toxicology & Chemical Dosimetry and Statistics were rated excellent. A great deal of progress has been made in preparing for the DRC meeting and in the format itself, and there were recommendations for some minor refinements for the future. The DRC commended the Laboratory for planning to build a facility to house visitors. The DRC also complimented us on our responsiveness to recommendations made in 1999.

### Specific Comments:

For Nanoscience:

- The Federal initiative fits PNNL strengths and a strong effort should be made to attract significant funding from this initiative.
- With a world-class array of instruments and capable scientists in Environmental Monitoring Sciences Laboratory (EMSL) along with a very capable leader, the Laboratory is well positioned to contribute and should have an impact in this area.
- It was recommended that the Laboratory strengthen nanoscience and consider taking advantage of EMSL to expand into other nanofields.

For Toxicology & Chemical Dosimetry:

- Excellent presentations were made in important and widely recognized potential problem areas.
- There is a clear lack of critical mass in personnel, space, and equipment, and the Laboratory should commit to ongoing programs by seeking funding for laboratory revitalization, new personnel and new equipment.
- The group should seek collaborations with local universities to accelerate progress in biology.
- A comprehensive and separate review of the Laboratory's entire biology program should be considered.

For Statistics:

- Presentations were well prepared and demonstrated excellent capability and the importance of the subject.
- The DRC believed that more information about the Laboratory's current and new programs would be a help to the group.

- The Laboratory should incorporate the Statistics group's desire for growth into its plans and consider whether maintaining an independent group or a formal matrix of the group into Laboratory programs is the most effective method to deliver the group's services.

For Education & University Relations:

- A comprehensive and well thought out program was presented, and the staff should be praised for their exceptional skills and enthusiasm.
- Importance to the Laboratory was demonstrated since Laboratory organizations supported it with their own budgets after DOE funding was severely cut.
- It was suggested that the Laboratory advertise for proposals to form Joint Institutes in order to market the Laboratory as well as acquire the best collaborators.

### External Program and Proposal Peer Reviews

**Chemical Physics Program, Office of Science, Office of Basic Energy Sciences (OBES), Chemical Sciences Division.**

The review was held in March of this year and is an annual review in which Basic Energy Sciences (BES) projects are examined every two to three years. This year the OBES-sponsored and -staffed review of the program had four external reviewers.

General Comments: BES was pleased to see the improved interaction between theoreticians and experimentalists as a result of co-location of their offices. The four reviewers stated without exception that the EMSL facilities were excellent with well-equipped Laboratories, very high quality science, good collaborations with strong external groups, and an enthusiastic staff. The overall quality of the research is equivalent to the best research carried out in top US universities and national laboratories.

**Materials Science Program, Office of Basic Energy Science, Materials Science Division**

The final report for this review has not been received. The following summary reflects feedback provided by two of four reviewers who led the review this year.

An external review of the PNNL Materials Sciences projects supported by DOE's Basic Energy Sciences was held on June 7-8, 2000, and the reviewed projects were very well received. The reviewers stated that the "general impression of the meeting was one of the overall excellence" and the projects "represent top-rate science." "The staff was outstanding, and the choice of programs was appropriate to the Laboratory mission." Both reviewers noted that the projects have been extremely productive (as measured by publications in prominent peer-reviewed journals) considering the limited manpower and the relatively small level of funding. In a related remark, one reviewer noted that the "DOE-BES funding level at PNNL is much lower than the quality of science merits."

Both reviewers commented on the excellent and impressive facilities available at EMSL.

In summary, the reviewers believed that the "work done at PNNL is of a very high level and every effort should be made to make the laboratory a world-center in certain areas" and that "PNNL researchers are in good position to continue to lead the materials community in these focus areas and also take advantage of many new funding initiatives in nanotechnology and biomaterials."

## Office of Biological and Environmental Research Life Sciences Review

On February 16-17, 2000, a special review team, paneled by Dr. Mina Bissell, was commissioned by OBER to review life sciences capability at the Laboratory. As a result of that review, the environmental microbiology group will become the lead laboratory for the newly created Microbial Cell Program within OBER. OBER has made commitments to fund microbial research and support a leader upon his/her hire. With OBER's encouragement and support, the Laboratory has proposed a new LDRD Initiative in this area with the expectation that it will quickly lead to new OBER programs in environmental microbial biology.

It is important to note that the review team also suggested to the Laboratory that it concentrate its research on microbes and not on higher life forms. The review team stated that "the eukaryotic studies do not have scientific depth" and that this "area needs to be well developed by attracting visible collaborators to the EMSL and by recruiting to a well-defined area." In response, the Laboratory has hired Dr. H. Steven Wiley, a prominent scientist with expertise in linking complex systems biology with computational tools, and the Environmental Health Initiative is restructuring its outreach into cellular information processing (rather than environmental health), a fundamental process in both microbes and eukaryotic cells. Additional EMSL collaborations have been put into place with the University of Washington and Oregon Health Sciences University as well as Lee Hood's new Institute. Had the Laboratory interpreted that input literally, it would not now be able to adequately exploit its membership in the JGI. Discussions with the JGI on September 26 on the formalization of the PNNL/JGI relationship via an MOU has validated that the JGI is most interested in pursuing those PNNL capabilities dealing with complex organisms, namely expression of proteins and derivation of eukaryotic yeast-produced antibodies from them in addition to the proteomics work that will inevitably include proteomes from complex organisms up to and including humans. Also, the projects currently funded by the OBER/EM "lowdose" program all employ eukaryotic (mammalian) cells.

## Office of Biological and Environmental Research Proteomics Review

In January, a special review team was commissioned by OBER to review the Laboratory's proteomics capabilities with respect to mass spectrometry technologies. As a result of that review, BER funded a \$1.1M pilot project to develop and demonstrate technologies and determine the proteome of *Deinococcus radiodurans*. The project was reviewed again on August 17 to determine if the project had met its milestones. The review was an outstanding success. The project met all of its milestones (most ahead of schedule) and on budget. As a result, the Laboratory received a \$1.5M allocation to continue the proteomics work in FY2001 and the commitment for a \$1.5M capital equipment allocation to acquire the equipment necessary for a dedicated effort. In addition, this success was a significant factor in the decision by OBER to name PNNL as one of two Laboratories (ORNL is the other) to become new members of the Joint Genome Institute (JGI) together with the original members (LANL, LLNL, and LBNL). The JGI is the primary DOE facility associated with the Human Genome Project. PNNL completely missed any participation in the Human Genome Project. Selection for membership in the JGI assures that the Laboratory will be a leading participant in the post-genome programs that will determine the identity and function of proteins encoded by the genome. The importance of this accomplishment to the future of biological science in the Laboratory cannot be overstated. It was a crucial and wonderful win.

**Environmental Management Science Program (EMSP):** DOE has yet to formally announce the winning proposals. However, indications are that, 25 proposals for a total of \$25M will be supported, subject to change as a result of Congressional action. Four of eleven PNNL-led proposals were selected as well as 1 out of 7 proposals lead by other institutions but in which PNNL staff participated. Total funding expected by PNNL is \$3.75M or 20% of all renewals granted nationwide and 30% of available funding.

**Natural and Accelerated Bioremediation (NABIR):** PNNL had five projects funded for a total of \$915K. The Laboratory also has continuing funding for projects that were not up for renewal. PNNL continues to be the institution with the largest NABIR-sponsored portfolio.

**Experimental and Computational Structural Biology:** This OBER program sponsored a competition for \$5M for national laboratory participation. PNNL won a \$1.0M project in structural genomics. This is a research topic for which PNNL has not been funded in the past but which has become an extremely important research topic in the post-genome era following the recent public announcement of the draft human genome by DOE & NIH. It will utilize EMSL's NMR capabilities in new and important research.

**Recognition by the scientific community:** Staff recognition in the state, regional, national and international communities are evaluated across the three key dimensions of awards, invited talks, and committee service. In comparison to the past 3 years, recognition increased significantly. The total number of awards, invited talks and committee service rose from 196 in FY1999 to 257 in FY2000. Achievements across each dimension of recognition are presented below and reflect the broad context of our impact. Figure 1.1.1 provides a breakdown of the categories of recognition by fiscal year.

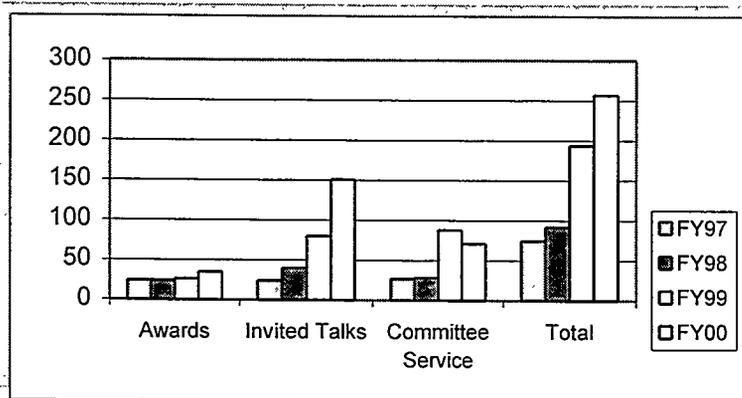


Figure 1.1.1

Highlights of our performance are presented below:

**Awards:** 22 PNNL staff members received 24 individual international, national, state, or regional awards and 11 awards were shared.

- 9 staff members were named Fellows: **George Vargo** and **Leonard Bond**, Institute of Physics; **Chuck Peden** and **Bruce Kay**, American Vacuum Society; **Steve Bruemmer**, American Society of Metals; **William Weber**, American Ceramic Society; **Jim Fredrickson**, American Academy of Microbiology; **Bruce Garrett**, American Physics Society; and **Obie Amacker**, Institute of Nuclear Materials.

- **Jean Futrell** received the Erwin Schrodinger Gold Medal for his lifetime achievements in the field of mass spectrometry.
- A 1990 paper authored by **Joseph Loo, Charles Edmonds, Charles Barinaga, and Harold Udseth and Richard D. Smith** (all with PNNL in 1990) entitled "New Developments in Biochemical Mass Spectrometry: Electrospray Ionization" has been recognized as the most cited article published in *Analytical Chemistry* during the 10-year period from 1989 through 1999.
- **William Weber** has been selected as a Highly Cited Author by Essential Science Indicators (ESI) of ISI Thomson Scientific. ESI is a new, Web-based compilation of science indicators and trend data derived from the ISI database, focusing on highly cited papers, authors, organizations, journals, disciplines and nations. ESI analysis indicates that 11 papers Dr. Weber has authored have been cited a total of 685 times, place him among the top 5 most-cited researches of the 1990s in engineering.
- **William Weber** was awarded the best "research bullet" for his BES Materials Science work that will be used by DOE SC to justify their budget to Congress in FY01.
- **Rich Johanson** received the DOE industrial hygienist of the year award at the American Industrial Hygiene Conference and Exhibition in Orlando, FL on May 24, 2000. Rich is the first PNNL staff member to receive this award.

Invited Talks: 151 invited talks qualified under this indicator.

- **Gordon Dudder** presented "Plutonium Round Robin Test — Final report." In: Sixth Meeting of the Nuclear Smuggling International Technical Working Group (ITWG) in Vienna, Austria on June 9, 2000.
- **Kenneth Ames** presented "Zelevnogorsk, Russia: Creating a Business Environment with the International Development Center" at Institute of Nuclear Materials Management 41<sup>st</sup> Annual Meeting in New Orleans, LA on July 18, 2000.
- **David Koppenaal** presented "Reaction Chemistry in Elemental Mass Spectrometry: Putting Chemistry to Work" at American Chemical Society National Meeting in Washington, DC on Aug. 21, 2000.
- **Steve Goheen** presented "Surface-Mediated Unfolding of Solute Proteins During Ion Exchange HPLC Separations" at 19<sup>th</sup> International Symposium in Delray Beach, FL on Nov. 2, 1999.

Committee Service: 52 staff members are currently serving on 71 science related committees. Particularly noteworthy positions include the following:

- **Steve Bruemmer.** General Chairman & Co-Editor, 9th International Conference on Environmental Degradation of Materials in Nuclear Power Systems - Water Reactors. (August 1999-May 2000)
- **Gregory Exarhos.** American Vacuum Society Executive Board of Directors. (Oct. 1, 1999-Oct. 31, 2001)
- **Bill Chandler.** U.S. President's Committee of Advisors on Science and Technology, International Energy Panel. (2000-present)

- **James Franz.** Editorial Board of the American Chemical Society Journal, Energy & Fuels. (Jan. 1, 1994–present)

**Number of R&D 100 and FLC Awards:** In FY2000, the Laboratory won a total of 6 R&D 100 and FLC awards. We won 3 out of 8 entries submitted to R&D Magazine's Awards for the Top 100 Technologically Significant Processes and Products for 2000. In addition, PNNL staff won 3 out of 3 entries submitted for the 2000 FLC Awards for Excellence in Technology Transfer. This indicator helps us understand our strength in developing and transferring relevant technologies that are valued by the technical community.

**R&D 100 Awards**

- Multi-Blade Knife Failure Detector (KFD) for Food Processing
- Sunna Dosimeter™
- Ultra Barrier Coatings for Flat Panel Displays

**Federal Laboratory Consortium (FLC) Awards**

- Molecular Science Software Suite (MS3)
- Plasma Enhanced Melter for Waste Conversion
- Superplastic Forming for Automotive Component Manufacturing

PNNL continues to demonstrate its science and technological excellence in these competitions as evidenced from the results in Table 1.1.1, following.

**Table 1.1.1. R&D 100 and Federal Laboratory Consortium Awards by National Laboratory**

<b>National Laboratory</b>	<b>R&amp;D Awards (1964-2000) (ranking in parentheses)</b>	<b>FLC Awards (1984-2000) (ranking in parenthesis)</b>
<b>Multiprogram Laboratories</b>		
Argonne	75 (3)	20 (4)
Brookhaven	23 (9)	10 (7)
Idaho	25 (8)	6 (9)
Lawrence Berkeley	25 (8)	16 (5)
Lawrence Livermore	82 (2)	25 (2)
Los Alamos	68 (4)	13 (6)
Oak Ridge	107 (1)	24 (3)
Pacific Northwest	54 (6)	44 (1)
Sandia	57 (5)	10 (7)
<b>Single-Program Laboratories</b>		
Ames	14 (10)	16 (5)
Fermi	13 (11)	1 (10)
National Energy Tech Center	1 (3)	9 (8)
NREL	29 (7)	9 (8)
PPPL	2 (12)	0 (11)
<b>Other Laboratories and Facilities</b>		
Hanford Site	3 (11)	0 (12)

**Publication Growth:** Publication in the open literature is an indicator of scientific quality and relevancy, as well as being a measure of our productivity and external recognition. Publications represent a significant mechanism by which our science and technology reaches the national and international community. In order to assess our performance we utilize the research services provided by ISI (Institute for Scientific Information). In FY2000, 573 publications qualified for inclusion under this indicator. FY2000 results reflect a 7% increase over the average of the previous 3 years (see Figure 1.1.2), which exceeded our expectations of 5% growth.

A review of Figure 1.1.2 shows that our publication rate is down from that of FY1999. An analysis conducted in late FY1998/early FY1999 indicated that a variety of factors influence publication rates. Our analysis led us to adopt the 3-year rolling average as a mechanism for accounting for variability. Our expectation is that we continue to achieve 5% growth over the 3-year average.

An example of the diversity of our contributions in the open literature can be seen in Table 1.1.2. This table presents those publications where PNNL published 5 or more articles in FY2000. A comparison to FY1997-FY1999 results is also provided.

One method of judging quality of journals is to look at the impact factor. This ranking, developed by ISI, is calculated by dividing the number of current citations to articles published in the previous two years by the total number of articles published in the previous two years. In FY2000, PNNL published in 249 different publications. Of these titles, 82 or 33% have an impact factor putting them in the top ten for their subject areas (52 titles have no impact factor because they are conference proceedings or too new). Since this is the first year we have tracked this metric, it will form a baseline for future comparison.

Table 1.1.2. Comparison of Selected Peer-Reviewed Publications in which PNNL Staff Publish.

Publication Titles with More Than 5 PNNL Authored Papers, sorted by FY2000				
Journal Title	FY1997	FY1998	FY1999	FY2000
Journal of Chemical Physics	21	22	29	33
Journal of Physical Chemistry A	10	17	17	27
Journal of the American Chemical Society	10	12	12	17
Analytical Chemistry	6	12	11	16
Surface Science	8	11	20	16
Environmental Science and Technology	7	1	3	11
Journal of Geophysical Research-Atmospheres	11	6	1	10
Journal of Physical Chemistry B	9	13	8	10
Chemical Physics Letters	3	7	7	8
Health Physics	3	1	3	8
Journal of Nuclear Materials	32	13	41	8
Journal of the American Society for Mass Spectrometry	1	3	1	7
Physical Review B	9	6	3	7
Journal of Magnetic Resonance		4		6
Toxicological Sciences		1	1	6
Applied and Environmental Microbiology	1	2	1	5
Applied Physics A-Materials Science and Processing				5

Numbers of citations of PNNL papers is an indication of the quality and relevance of our research activities, but the information underlying the numbers is far more telling. A striking example of PNNL's high citation rate is the 1990 paper by Joseph Loo, Charles Edmonds, Charles Barinaga, and Harold Udseth and Richard D. Smith (all with PNNL in 1990) entitled "New Developments in Biochemical Mass Spectrometry: Electrospray Ionization" which was recognized this year as the most cited article published in Analytical Chemistry during the 10-year period from 1989 through 1999. Yet another example is that of William Weber who was recognized by ESI as a Highly Cited Author. ESI determined that Dr. Weber has authored 11 papers that have been cited 685 times, placing him among the top 5 most cited researchers of the 1990s in engineering.

**Number of Quality Academic/Scientific Partnerships:** One hundred sixteen (116) colleges/universities met College and University Relations criteria for institutional partnerships (e.g. informal and formal agreements, appointments, and significant interactions and collaborations) at the end of the fourth quarter. This represents a 23 percent increase over FY1999. Colleges/universities that represent the fifty-seven (up 46% from 39 in FY1999) in the more substantial (that is, "robust" and "developing") categories of partnership are:

University of Washington	New Mexico Institute of Mining & Tech	Utah State University
Washington State University	Oregon Graduate I.	West Virginia University
Oregon State University	Purdue University	Western Washington University
University of Idaho	UC Berkeley	Alfred University
Ohio State University	University of Florida	Boise State University
Pennsylvania State University	University of Maryland	Brigham Young University
Texas A&M University	University of Montana	California Institute of Technology
Heritage College	University of Oregon	Colorado State University
Massachusetts Institute of Technology	University of Wisconsin	Columbia Basin College
Montana State	Yale University	Florida State University
SUNY	Eastern Oregon University	Georgia Institute of Technology
University of Arizona	Indiana University	Johns Hopkins University
University of Colorado	Kansas State	Oregon Health Sciences U.
University of Michigan	Northwestern University (IL)	Portland State University
University of South Carolina	Tulane	UC San Diego
University of Texas	UC Davis	UC Santa Barbara
Eastern Washington University	University of Illinois	University of Alaska
University of Minnesota	University of Nevada	University of New Mexico
University of Utah	University of Tennessee	University of Pittsburgh

There are also continuing interactions with 59 (up 7% from FY1999) other academic institutions that constitute "emerging" partnerships. In addition to these academic partnerships are ongoing interactions with 372 (more than double FY1999) other colleges and universities, representing relationships that could develop into partnerships in the next fiscal year.

Critical indicators of partnerships with colleges and universities were carefully monitored throughout the fiscal year. The (20-parameter) performance database tracked the Laboratory's interactions and partnerships with 488 colleges and universities (in 49 states of the Union and 26 foreign countries) in FY2000—a 78 percent increase over year-end FY1999.

A key factor in increasing these Laboratory-university interactions has been an aggressive communications and outreach campaign to boost awareness within academia of PNNL opportunities for

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research, education, and professional development. Through this effort the Laboratory staff coordinated and hosted the visits of over 385 faculty and advanced students.

Conversely, the Laboratory staff also brought messages of access and opportunity to the students and faculty on their campuses and in various conferences and meetings. Specifically, University and Science Education (USEP) staff addressed an additional estimated one thousand interested individuals through invited papers and presentations delivered at ten conferences and professional society meetings throughout the year.

The parallel activities of Associated Western Universities to facilitate and administer student and faculty interactions with PNNL also show considerable growth over the subject period.

In summary, these various actions to increase knowledge of and interest in PNNL as a prospective partner in R&D and education contributed significantly to the year's 78 percent growth in academic interactions. Further evidence of the success of this program was the recognition of merit it was afforded by the DRC and LRC.

## **1.2 Success in Operating Research Facilities**

### **Results**

Productivity, in terms of publications and user satisfaction provide highly relevant data to enable our understanding of the contributions made by those user facilities, extended research facilities, and distributed research centers entrusted to us.

EMSL's users value the resources and capabilities provided. EMSL's productivity, measured by publications and peer review, indicates that scientists are impacting the nation at increasing levels. We expect those levels to continue to increase over the long-term. As ascertained from peer review comments, this facility is well managed and can have strong and enduring impacts on the nation's scientific agenda.

The effectiveness of Atmospheric Radiation Measurement (ARM) is also manifest in its productivity and user satisfaction results. ARM is sustaining increasing publication rates that continue to exceed our expectations. Additionally, the Science Team ranks the quality of services and products provided highly.

Although more progress is needed, we have accomplished much of what we had hoped to with G-1 Aircraft Operations. Additionally, we are seeing promising progress from the newly formed Terrestrial Carbon Sequestration Center.

Based upon the performance indicators that support this objective, our rating for FY2000 is **Excellent**.

### **Analysis**

#### **EMSL**

In order to understand our success in operating the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) we look at three performance indicators. The Number of Users provides us with information regarding our impact to the greater scientific community, Publication Growth provides us with insight into the productivity resulting from use of EMSL, and User

Satisfaction provides information on how effectively we manage and operate EMSL as judged by Users. Information provided through peer reviews allows us to correlate our indicators with overall performance.

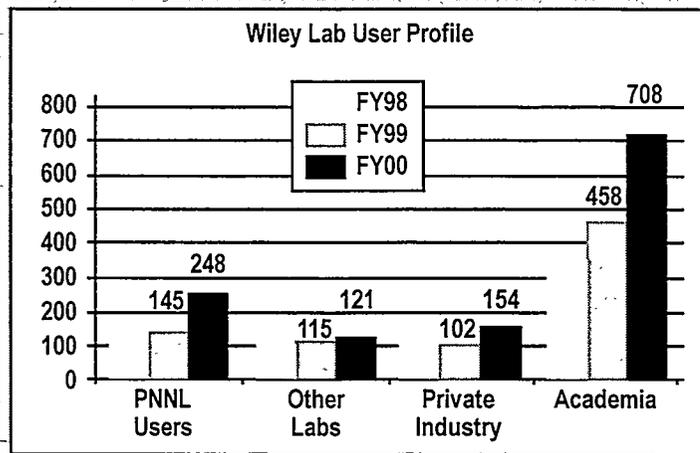


Figure 1.2.1. Annual Wiley Laboratory User Profile

**Number of Users:** For EMSL to be successful it must attract users that reflect a broad and diverse user base. The number of EMSL users has grown to 1231 in FY2000 compared to our “threshold” of 600. Figure 1.2.1 shows that this number represents a broad spectrum of participants, with the largest number from the academic community. This represents significant growth in the number of users.

**Publication Growth:** Another indicator of relevance and impact of the EMSL is the number of publications that are produced using the EMSL, by non-EMSL staff. Capturing this data has proven to

be a significant challenge since much of the user community’s productivity resulting from use of EMSL is beyond our control. We have developed some mechanisms to help us get the relevant information we need. The results obtained to date indicate that we have exceeded our target for EMSL publication productivity. Non-EMSL staff published 172 publications in FY2000 which far exceeded our expectation for 15% growth or better. This growth may in part reflect that the mechanisms we put in place to capture publications by others is working.

**EMSL User Satisfaction:** One of the key measures of EMSL’s contribution and relevancy to the scientific community is ascertained through the use of a user satisfaction survey. This survey helps us to understand our effectiveness at meeting the needs of researchers, and it helps us understand EMSL’s impact. Finally, this survey helps us identify areas where we can improve. Results collected to date indicate that we are performing at the outstanding level. This is evidenced by the strong and highly positive responses we have received to our survey. In fact, the feedback we receive indicates that greater support by EMSL staff, as well as enhanced instrumentation would be most relevant. On the one hand, this tells us that we are doing everything right, on the other hand, it indicates that the broader user community requires more. The challenge will be to maintain budgets commensurate with the needs of the broader research community in the future. Responses across several key questions are presented below:

The User Satisfaction response rate so far is 7.0 %. Overall, the results are very positive:

- 90 % of users are satisfied or very satisfied with the way the EMSL environment facilitated scientific accomplishment.
- 90 % of users were satisfied or very satisfied with the availability of the existing facilities and equipment.
- 82 % of users were satisfied or very satisfied with performance (e.g., were facilities and equipment maintained to appropriate specifications for your intended use)?

- 92 % of users were satisfied or very satisfied with the support provided by the EMSL staff?

Overall, 58% of EMSL users were very satisfied and 28% were satisfied which exceeded our expectations. The response rate to date however is low. We will continue to accept surveys and evaluate the results accordingly.

## ARM

In order to understand our success in coordinating the use of the ARM Extended Research Facilities we look at two performance indicators. Publication Growth provides us with insight into the productivity resulting from use of ARM, and User Satisfaction provides information on how effectively we manage the day to day operation of ARM as judged by Users.

Information provided through peer reviews allows us to correlate our indicators with overall performance.

**Publication Growth:** Like EMSL, one of the ARM Program's ultimate measures of productivity is through the publications of its science team. Here again we witness our impact through our contributions to the greater body of knowledge, in global climatic change, through our publication productivity. In FY2000 we achieved a publication rate of 143 which surpassed our expectation of 135 or 10% growth.

Figure 1.2.2 provides a comparison of the growth of ARM-related publications.

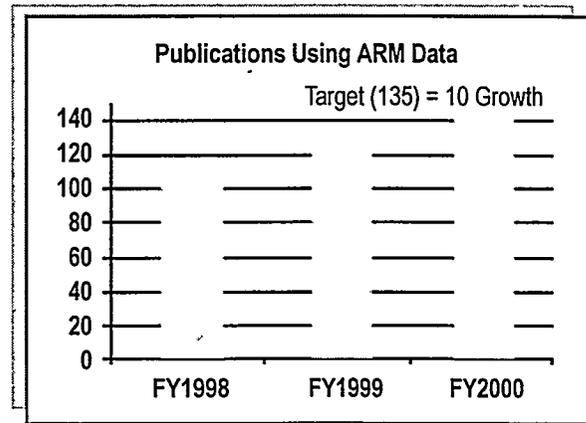


Figure 1.2.2

**User Satisfaction:** A user satisfaction survey was completed in September. One hundred percent of respondents reported being either satisfied or very satisfied with the Experiment Center Services and support. More specifically, half of the survey respondents rated "user services" very satisfactory with the other half rating them satisfactory. "Overall satisfaction" was rated very satisfactory by 57% and satisfactory by 43% which exceeded our expectations. ARM performance from both a user satisfaction and productivity (as measured by increased publication rate) standpoint was outstanding.

## G-1 Aircraft Operations

Effective stewardship of this asset is measured by a combination of three indicators: 1) Research Protocols and Methods, 2) Implement an Advisory Panel for the Research Aircraft Facility, and 3) Real-time Wind Display. Based upon results, our performance was excellent in FY2000.

**Research Protocols and Methods:** Every PNNL instrument on the G-1 has associated with it a detailed description of the protocol or method by which the instrument is to be operated. This year we initiated an extensive overhaul and updating of the existing protocols and methods in preparation for two extended field studies. All of the most critical protocols were revised and updated and several new protocols were developed for newer systems. As it became necessary to shift our manpower to actually preparing the Gulfstream 159 (G-1) aircraft for the field studies, progress on revising protocols slowed considerably. Attention will again be given to revising

protocols during the “off season” for the G-1. Because there are still protocols to be revised, though for the less important instruments, we gave ourselves only an “Excellent” rating on this critical outcome.

**Convene Advisory Panel for the Research Aircraft Facility:** Panel members with experience in conducting airborne research were recruited from our sister Laboratories, the National Science Foundation, and the National Aeronautics and Space Administration. The advisory panel met in mid June, just prior to the start of one of our major field studies for the year. As the first meeting of this group, we provided the panel with an in-depth overview of every aspect of the operation of the Battelle Gulfstream 159 aircraft as a research aircraft facility in support of the DOE Atmospheric Chemistry Program. Among the comments from the panel were several that could affect future operations: 1) we were operating in a resource (funding and personnel) limited environment; 2) we must be able to quote non-ACP users a firm cost for using the G-1 in other projects, end of the year adjustments demanded by full cost recovery are unacceptable to outside users; 3) acquisition of another aircraft by PNNL could allow an increase in pilot staff that would permit stable growth in the use of the G-1; 4) in-house instrumentation on the G-1 needs to be upgraded to current state-of-the-art; and 5) our operations compares very favorably with those in other federal agencies. It was suggested that the next meeting be held in conjunction with the next annual meeting of Atmospheric Chemistry Program investigators. We are currently reviewing the make up of the panel and are considering adding a member with flight operations experience. We believe an expert such as this would serve to strengthen how we assess flight operations. A rating of outstanding was given because we felt we had accomplished the intended purpose of the panel and the panel provided valuable insights and suggestions regarding our operations.

**Real-time Wind Display:** Data are routinely acquired by a data acquisition system on board the G-1 for calculating vector winds aloft during post-flight data processing. However, on-board scientists have long wanted a display of these winds during flight. Our intent was to implement the necessary algorithms on our data acquisition and display system for doing so. Progress was good until the time came to prepare the G-1 for the field studies. The algorithms used in the post-processing of the data were converted for in-flight operation but installation of those algorithms on the data acquisition system was put at a lower priority relative to other preparations needed to support the field studies. Once those preparations were begun, all knowledgeable staff were tied up with higher priority activities. When post-field study data processing has been completed, attention will again be given to providing real-time, in-flight winds to on-board scientists. There was no loss of data because this capability was not available for this summer’s field studies. Nevertheless, because this was an item we had truly hoped to complete before the field study season and were unable to do so, we gave ourselves only a good rating.

### **Terrestrial Carbon Sequestration Center (CSiTE)**

CSiTE is a newly established distributed research center led by PNNL and Oak Ridge National Laboratory with Argonne National Laboratory, five universities, four USDA research laboratories, and two independent research centers functioning as collaborating partners. CSiTE uses collaborative partnerships conduct new basic research as well as analyze existing knowledge and experience to develop the scientific understanding needed to evaluate the feasibility of environmentally sound strategies for enhancing carbon sequestration in terrestrial ecosystems. Performance was measured under three supporting indicators: 1) Number of publications, presentations and workshops, 2) CSiTE funding relative to that of OBER, and 3) Demonstration of the impact of CSiTE research to the nation. Based upon our results we rate our overall performance as excellent.

During FY2000, 3 peer reviewed articles were written and 3 invited presentations were given. Six proposals were submitted, but none were funded. However, additional OBER funding has recently been received and we anticipate and will seek additional funding consideration for the center. While CSiTE is still very young, the anticipated impact of CSiTE research is seen by the level of industry interest and engagement, which has included unsolicited inquiries for collaboration opportunities from Tennessee Valley Authority, and America Electric Power Company. In late October 2000, an industry conference is scheduled.

Based on our expectations for this year, publications, presentations, and workshops is rated excellent, funding is rated good, and demonstration of impact to the nation is rated excellent.

### **1.3 Effectiveness and Efficiency of Research Program Management**

#### **Results**

To be recognized as demonstrating truly, effective, and high quality leadership is one of the hallmarks of an organization's strength and depth of character. Leadership relies heavily on the ability to look outward. To listen carefully, dissect intently, and develop strategies that can respond to the most pressing needs of the customer is fundamental.

Personal interviews with key programmatic customers form the basis for Battelle's assessment of our progress toward meeting this Objective. These interviews provide DOE and Battelle an opportunity to rate the quality, technical and managerial leadership in each of the four DOE mission areas.

#### **Analysis**

**Demonstrate programmatic leadership within Fundamental Science:** Due to scheduling conflicts, we were unable to schedule an interview in time for inclusion in this report, however, a joint interview, focused around the following four key dimensions of leadership will be conducted by Gerry Stokes and Debbie Trader in late October 2000:

- The quality of our leadership,
- Our ability to effectively team with other laboratories and universities,
- The degree of Laboratory Institutional support provided, and
- Overall program quality.

The interview will focus on our leadership in programs chosen from the following:

- Atmospheric Radiation Measurement (ARM),
- Accelerated Climate Prediction Initiative (ACPI),
- SSI Scientific Simulation Initiative
- BES-Materials Sciences Program
- BES-Chemical Sciences Program, and
- Environmental Molecular Sciences Laboratory (EMSL)

Based on our performance this year, including the results from peer reviews, we expect to achieve an Outstanding rating.

## Environmental Quality Mission

Many of the indicators we use to determine our level of performance and predict how our customer will view our performance transcend one or more of the four key objectives identified in the Performance Evaluation and Fee Agreement. For that reason, our results are presented instead in sections. Each section title describes, to the degree possible, the key objective or objectives to which the indicators correlate. For example, performance indicators were developed specifically around four key programs that are important to our customer. As a result quality, relevance and research program management performance is specific to each program. We have provided a high level view of our performance in these areas in sections 1.1 through 1.3. However, specific results by program are provided in section 1.4. It should also be noted that the Objective entitled, "Success in Constructing and Operating Research Facilities", is not applicable to this mission area.

## Office of Environmental Management (DOE-EM)

Our Science and Technology Excellence Critical Outcome is to conduct high quality, leading edge, scientific research and development programs in a safe, environmentally sound, efficient manner. The underlying objectives to this critical outcome in relation to the Office of Environmental Management are:

- Quality of Science and Technology
- Relevance to DOE Mission and National Needs
- Effectiveness and Efficiency of Research Program Management.

The Pacific Northwest National Laboratory (PNNL) and the Department of Energy's (DOE) Richland Operations Office engaged DOE's Office of Environmental Management (EM) at the end of FY1999 to determine critical performance areas for EM funded work at PNNL. Four key performance areas were identified as the work most relevant to DOE's Environmental Quality mission, funded by EM, and conducted by PNNL. The key performance areas identified were:

- Work conducted for the Office of River Protection
- The Groundwater/Vadose Zone project
- The national Tanks Focus Area
- The Environmental Management Science Program

Self-assessment results for each key programs above are based on an evaluation of the progress made against the performance indicators developed during our self-assessment planning process. During the planning process a scoring system was devised for each key program to help define an adjectival rating for FY2000 performance. See 1.4, Key Program Results for details.

In addition to the work conducted in the four key performance areas, PNNL staff collaborated with Flour Hanford Staff on an expedient, cost-saving approach to stabilizing 1,600 polycubes of degrading plutonium at Hanford. The two-inch cubes of plutonium were fabricated in polystyrene in the 1960s for innovative criticality testing to determine safe storage parameters for large volumes of plutonium wastes. The polycubes are deteriorating, causing storage challenges and

potential environmental risks. Research showed the material could be stabilized using existing muffle furnaces, thereby avoiding a costly middle step, reducing work schedule by years, and saving up to \$5 million.

Based upon the overall results we delivered in FY2000 our performance on key programs is rated **Excellent**.

### **1.1 Quality of Science and Technology**

Quality is an element of each approach used to assess our performance in the key programs. Groundwater/Vadose Zone (GW/VZ) draws heavily on the National Academy of Sciences (NAS) and Peer Review Panels to ensure the quality of products developed. Office of River Protection (ORP) and Tanks Focus Area (TFA). Customer feedback surveys and interactions specifically asked about the quality of the products and services we delivered. The Environmental Management Sciences Program (EMSP) management system includes an action to validate the need to ensure the research is customer focused. Though not a part of the EMSP management system, publications, presentations, and technical exchanges are a very important part of the program that enhances scientific and technical knowledge. Based on the quality components of the evidence provided in the self-assessment of the key programs, our performance against the Quality of Science and Technology objective is **Excellent**.

### **1.2 Relevance to DOE Mission and National Needs**

Our overall approach to assessing EM performance is rooted in the Relevance to DOE Mission and National Needs objective. We worked with EM to identify the most relevant program areas. The four key programs identified throughout this assessment are product of that process. These key programs contribute to the national research agenda by addressing several elements of DOE's Environmental Quality (EQ) Research & Development (R&D) Portfolio. TFA and ORP work contributes to the Management of High-level Waste EQ R&D Portfolio element. Our GW/VZ work contributes to Environmental Remediation EQ R&D Portfolio element. Our EMSP work cross-cuts the EQ R&D Portfolio. Work on these key programs clearly fits within and advances DOE's EQ mission and contributes to the goals and objectives of DOE's strategic plans. Our EMSP work is contributing to U.S. leadership in international scientific and technical communities. Our remote systems, separations, measurement & control and immobilization technical capabilities are sought out by industrial partners for teaming to solve DOE and other federal agency needs. The performance indicators used to evaluate performance on the key programs do not speak directly to this objective; the analysis provided above shows strong ties between our capabilities, our critical focus, and DOE Mission and National Needs. Based on this analysis, our performance against the Relevance to DOE Mission and National Needs objective is **Outstanding**.

### **1.3 Effectiveness and Efficiency of Research Program Management**

Our cumulative performance on the four key programs goes directly to our performance on Effectiveness and Efficiency of Research Program Management. The performance indicators used to evaluate performance on the key programs are heavily weighted to on-time, on-schedule performance, consistent with customer expectations. Based on the evidence provided in the self-assessment of the key programs, our performance against the Effectiveness and Efficiency of Research Program Management objective is **Excellent**.

## 1.4 Key Program Results

### Office of River Protection (ORP)

**Results:** Overall, the results indicate that we are generally performing at a high level. The results also indicate opportunities for improvement, particularly in our communications process during planning and delivery. Based upon progress on the performance indicators used as evidence of achieving our objective to effectively support ORP, our rating for FY2000 is Excellent.

**Analysis:** Our support to ORP was significantly impacted by the activities leading up to the termination of BNFL for convenience and the transition to CHG until a new contractor is hired. The uncertainty surrounding our ORP work impacted our plans for assessing performance on this key program. The original plans were developed in conjunction with ORP staff and called for a series of surveys of the work conducted by:

1. The Waste Disposal Integration Team (WIT) – these surveys were intended to cover three specific areas (Part B-2 Decision process, Part B-2 Authorization to Proceed process), and support to ORP in their efforts to respond to unanticipated issues. Each area was equally weighted. The WIT results were intended to represent 75% of the total weight for this key program.

WIT's changing scope has impacted the originally planned customer assessment process. Therefore, self-assessment of our FY2000 performance is based on both formal and informal feedback received from ORP during FY-2000, including input received in the last few months. Most recently ORP has been very complimentary of WIT's performance in the areas of the development of the Government Fair Cost Estimate for the Hanford tank Waste Treatment and Immobilization Plant (WTP), as well as preparation of the draft and final WTP Request for Proposals (RFP) and associated activities such as helping to develop draft answers to questions that were received on the final RFP. WIT submitted evaluation questionnaires to ORP in mid-April to provide formal feedback on WIT's performance. Formal and informal feedback results indicate WIT has been performing in the excellent to outstanding range. Based on the scoring system developed in the original assessment plan and the 75% weight applied to WIT activities, excellent to outstanding performance would translate into 120 points.

2. Staff supporting ORP mission planning and technical integration – these surveys were intended to cover four areas:
  - Strategic Planning and Mission Analysis (40% weight)
  - Life Cycle Cost Model (20% weight)
  - Project Management Planning (10% weight)
  - Balance of other support activities (30% weight)

Similar to the problems encountered with WIT, collecting customer feedback as originally planned was problematic. Year-end direct input was provided and accepted by our ORP leadership as blunt and actionable. Analysis of this feedback indicates the Strategic Planning and Mission Analysis work was marginal, the Risk Assessment work (only rated item in Balance of other support activities) was good, and the Life Cycle Cost Model and Project Management Planning work were outstanding. Using standard adjectival values (outstanding = 5.0, Excellent = 4.0, etc.) for the ratings in each area, originally planned weights for each area, and the overall 25% weight for these activities, performance translates into 27 points.

During the assessment planning process, we established a scoring system to evaluate overall performance for this key program. Based on the analysis above, we earned an *Excellent* rating for this key program.

### Groundwater Vadose Zone (GW/VZ)

**Results:** Overall, the results indicate that we are effectively leading the technical aspects of the GW/VZ project. We have received excellent comments from the Integration Project Expert Panel on Science and Technology (S&T), Systems Analysis Capability (SAC), and for the Vadose Zone Transport Field Study. The first three meetings with the NAS Review Committee were successfully completed, including kudos from the National Academy of Science study director, Kevin Crowley, and the committee members regarding the quality of the field trip and written responses to questions raised by the committee. We are working with DOE-HQ and Idaho National Engineering and Environmental Laboratory (INEEL) to expand S&T roadmapping efforts to INEEL site-wide and complex-wide vadose zone mapping. We implemented approximately \$4M of S&T field activities involving four National Labs and Universities. We have received positive customer survey results (written) from Bechtel Hanford (BHI) collected earlier this month regarding both S&T and SAC. We have conducted multiple peer reviews and public interactions. Direct customer feedback provided via survey is Outstanding. An elevated tritium occurrence was not identified and appropriately highlighted in a timely manner. Reviews were conducted and corrective actions put in place to prevent re-occurrence.

Based upon progress on the performance indicators used as evidence of achieving our objective to effectively lead the technical aspects of the GW/VZ project, our rating for FY2000 is **Outstanding**.

**Analysis:** Four performance indicators were used to provide an overall evaluation of our effectiveness in leading the technical aspects of the GW/VZ:

1. Inventory methodology and results from S&T task to SAC Rev 1 - We delivered the first sets of inventory data and reviewed this task with the NAS review committee in June and September. Feedback from the review committee is very complimentary. We are ahead of schedule on this task by delivering more data sets than originally planned. The task was suspended to permit the principal investigators from CH2M Hill Hanford Group and Los Alamos National Laboratory to provide tank-leak estimates for use in SAC, Rev. 0. In the detailed work plans by SAC, these estimates were to be generated by the River Protection Project. Further review revealed that tank leak estimates would be available for only a few of the tanks, so the S&T team was diverted from their planned work to apply the methodology to the remaining tanks and provide critically needed estimates for SAC, Rev. 0. This decision was made within the Integration Project to delay completion of the estimates and reporting of the soil waste inventories until the end of October 2000. This performance is consistent with earning 11 points for this indicator.
2. Implementation of strategy for Field Investigation at Representative Site - This task is working closely with River Protection Project (RPP) to evaluate uncontaminated and contaminated samples. The evaluation of uncontaminated samples is on schedule. However, this task has not yet received contaminated samples from the SX-108 slant borehole because they are undergoing characterization before they can be released to PNNL and other national laboratories. The samples were collected several months after the task had assumed in the detailed work plan for FY2000. This task was presented to the Integration Project Expert Panel and has received favorable feedback. This task also has close interactions with several

EMSP projects and plans are underway for another workshop with EMSP principal investigators at the end of November. Carryover scope and funding have been identified. This performance is consistent with earning 5 points for this indicator.

3. Implementation of strategy for Vadose Zone Transport Field Study - The task overcame a late start, completed the field experiment, and initiated the evaluation of results. Several of the other national laboratories identified scope and funding carryover into FY 2001 because they were unable to complete their data evaluations as planned during FY2000. This task was presented to the Integration Project Expert Panel and the National Academy of Sciences review committee and has received favorable feedback. A visit to the site was included in the recent field trip taken by the NAS committee. This performance is consistent with earning 5 points for this indicator.
4. Detailed System Design Requirements for SAC Rev 0 - The System Assessment Capability (Revision 0); Assessment Description, Requirements, Software Design, and Test Plan, BHI-01365, Draft A was completed on schedule and published in May 2000. The budget for this effort was \$511K, the work was completed for \$476K. It was distributed to DOE, the public, and Drs. Edgar Berkey, Michael Kavanaugh, and James Karr, a subpanel of the Integration Project Expert Panel for a management review. Dr. Mel Marietta of Sandia National Laboratory joined the panel to provide technical comment on the architecture and design of the approach being taken in the software design. An open and public review was conducted on June 20-21. The review panel issued a formal letter. The comments and recommendations of the subpanel were very positive and indicated there were no show stoppers to successful completion of SAC Rev 0 and the initial assessment. This indicates that a high quality product is being produced. This performance is consistent with earning all 12 available points for this indicator.

During the assessment planning process, we established a scoring system to evaluate overall performance for this key program. Based on the analysis above, we earned an *Excellent* rating for this key program.

#### Tanks Focus Area (TFA)

**Results:** Overall, the results indicate that we are effectively leading the technical aspects of the TFA. In addition to our base TFA work, the TFA team established an on-site Savannah River Site Salt Processing Project Office, led a Review requested by DOE-ID supporting the Record of Decision and down-selection of technologies for INEEL's treatment of sodium-bearing waste and calcine, and worked with DOE-OH on a request for assistance on the design review of waste retrieval technologies for Fernald silos 1 and 2.

Based upon progress on the performance indicators used as evidence of achieving our objective to effectively lead the technical aspects of TFA, our rating for FY2000 is *Outstanding*.

**Analysis:** Two performance indicators were used to provide an overall evaluation of our effectiveness in leading the technical aspects of the TFA:

The effectiveness of the TFA Technical team in working with site users, technical advisors, and DOE-HQ users to provide technology development recommendations that are responsive to their needs. A jointly developed survey was used for the third consecutive year as the means for making this evaluation. During August 2000, the survey was administered to the TFA Management Team, federal representatives from each of the five tanks sites and major EM-50 programs

in partnership with the TFA. Preliminary results from DOE-RL indicate that PNNL may earn as much as 9.3 points out of the 10 possible, earning 9 of a possible 10 points. Survey results from the prior years are 9.3 and 8.7 for FY98 and FY1999 respectively.

The effectiveness of the TFA Technical team in supporting EM's overall performance metrics for high-level waste by providing technical solutions to the key problems associated with meeting these metrics. A jointly developed list of twenty key deliverables is used to evaluate the effectiveness of the TFA Technical team's support to EM. Completion of eighteen of the twenty milestones is expected in FY2000, earning 18 of a possible 20 points. TFA has been notified by the contractors responsible for the missed milestones to expect completion in FY01.

During the assessment planning process, we established a scoring system to evaluate overall performance for this key program. Based on the analysis above, we expect to earn an *Outstanding* rating for this key program.

### Environmental Management Science Program (EMSP)

**Results:** Overall, the results indicate that we are effectively demonstrating leadership in EMSP supported research. In addition to the agreed upon metrics, we have been working to help the program succeed. The Principal Investigators (PI) and PNNL management have been supportive of the program by attending all EMSP functions, including having all PIs at the National workshop in September and attending topical workshops that the program has sponsored (e.g. the GW/VZ Kick-off meeting, the EMSP-NMFA workshop, the EMSP-Long Term Stewardship Meeting, etc.). This is especially noteworthy because of the large number of PIs we have (over 40 PIs and collaborators attended the EMSP National Workshop) and the added FY2000 travel restrictions. Our PIs have also been active in presenting results at professional forums, including Dr. Felmy's role in setting up an EMSP Session at the Spring 2001 American Chemical Society Meeting.

Our EMSP management team has increased the visibility and status of the program in various venues. These include:

- Support to the program office in setting up and running its various workshops throughout the year, such as the GW/VZ workshops
- We were a member on the Technical program committee of the National Workshop
- We helped set up and run a remote location for the Long Term Stewardship Sensors Workshop
- We provided input and discussions for other topical workshops
- PNNL made presentations such as the Waste Management 2000 talk, where we described our management system for EMSP projects and provided suggestions for how it could be transferred to other institutions and the program as a whole
- We helped improve the reputation of the program through Gerald Boyd's Core team, discussions with advisory groups (e.g. the EMAB Ad Hoc Committee on Science and Innovation and the Hanford STCG), and in presentations to various Focus Area teams to describe how the program as a whole is working on the complex's needs (SCFA, TFA, NMFA).

Based upon progress on the performance indicator used as evidence of achieving our objective to demonstrate effective leadership of EMSP sponsored research, our rating for FY2000 is *Outstanding*.

**Analysis:** One performance indicator was established to provide an overall evaluation of our leadership effectiveness through the development and maintenance of a management system for ensuring that the results of EMSP supported research at the Laboratory benefits EM. The management system we implemented awards points for specific activities completed by PNNL-led EMSP projects and other projects we participate in but do not lead. The table below shows actual results for FY2000.

Year	# of Projects		Needs		Disposition Plan		"Fate"		Total Points
	PNNL Lead	Lead by Other	PNNL Lead	Lead by Other	PNNL Lead	Lead by Other	PNNL Lead	Lead by Other	
1996	10	14			1.0/ea		1.0/ea	0.5/ea	20.5
					5.0		10.0	5.5	
1997	6	9			1.0/ea	0.5/ea			7.0
					6.0	1.0			
1998	8	5	0.5/ea	0.5/ea					6.5
			4	2.5					
1999	7	9	1.0/ea	0.5/ea					11.5
			7.0	4.5					
Totals	31	37	11.0	7.0	11.0	1.0	10.0	5.5	45.5

During the assessment planning process, we established a scoring system to evaluate overall performance for this key program. Based on the analysis above, we earned an *Outstanding* rating for this key program.

## National Security Mission

The results we deliver and the relationships we continue to foster indicate that we are conducting high quality, leading edge, scientific research and development programs at the **Outstanding** performance level. Regardless of DOE program office we are consistently entrusted with the leadership and/or management of programs of high importance to our customer, we deliver important new solutions to meet critical DOE mission needs, and our customers view us as outstanding. Clearly, we are creating and delivering value to our key customers.

Many of the indicators we use to determine our level of performance and predict how our customer will view our performance transcend one or more of the four key objectives identified in the Performance Evaluation and Fee Agreement. For that reason, our results are presented instead in sections. Each section title describes, to the degree possible, the key objective or objectives to which the indicators correlate. It should be noted that the Objective entitled, "Success in Constructing and Operating Research Facilities", is not applicable to this mission area.

## Office of Nonproliferation and National Security (DOE-NN)

To be successful we must be valued and trusted by our customer. For that reason, the ultimate indicator of our performance is customer satisfaction. During a DOE-RL/NN interview in July 2000, feedback on PNNL's FY2000 performance indicated that PNNL's performance continues to be Outstanding, that PNNL is a "well-managed, well-run" organization that continually

produces quality work in a timely and highly professional manner, and that PNNL has achieved outstanding performance in fulfilling the DOE/NN science and technology mission needs.

## 1.1 Quality of Science and Technology

The outstanding quality of the Science and Technology we deliver to our customer is best reflected by the results we have achieved, which are presented below.

Under the direction of the Provisional Secretariat of the Comprehensive-Nuclear-Test-Ban-Treaty (CTBT), a self-contained Automated Radio-Xenon Sampler/Analyzer (ARSA) system was installed in Freiburg, Germany and has been operating since October 1999 to autonomously collect and analyze hundreds of radio-xenon samples to monitor unauthorized worldwide nuclear weapons testing. Foreign governments also have selected ARSA as their CTBT aerosol sampler.

PNNL developed a fundamentally new approach to detecting Highly Enriched Uranium (HEU) using minor isotopes of uranium. This technique solved DOE's current HEU detection problems.

PNNL led a world-class team comprised of representatives from the University of Washington and eV Products to dramatically improve the size and quality of CdZnTe single crystals to enable their application in room-temperature radiation detectors. This new application enables high-resolution radiation detection with large detector systems at room temperature—a capability never before available.

Collaborating with the University of California, in Berkeley, PNNL developed methods to manipulate micro-spheres in micro-channels that will provide the chemical selectivity for analytical separations and sensing. These new methods enable a fundamental approach to solve the problem of high sensitivity measurement of chemicals in solutions.

Using PNNL's world-class infrared spectrometry capabilities located in the Environmental Molecular Sciences Laboratory, staff measured high-resolution, high-quality reference spectra of hundreds of compounds—creating the highest measurements available in the world for users of various National Technical Means Systems.

PNNL developed new pattern recognition techniques that merge our understanding of vapor/polymer interactions and sensor response with chemometric algorithms that detect vapors—a capability never before available. These techniques solve environmental and chemical warfare proliferation problems.

Our researchers created a versatile synthesis approach for sensing polymers for multiple sensing platforms and recently extended this approach to the photo patterning of small domains of sensing polymer on substrates. This approach provides spatial control of sensing material on micro-fabricated structures that were previously not possible.

The safety of Soviet-era nuclear power plants in the Former Soviet Union was significantly improved under PNNL leadership by providing state-of-the-art equipment, and training and technology to 65 nuclear units in nine countries.

Finally, a staff member served as the official U.S. spokesman on classified information protection (Information Barriers) in several forums associated with U.S.-Russian negotiations on securing and monitoring fissile materials from dismantled nuclear weapons.

## 1.2 Relevance to DOE Missions and National Needs

The relevance of our work to DOE Missions and needs is best articulated through the results presented below and reflect outstanding performance.

PNNL led the effort to integrate low intrusion technologies into the START III regime and is currently developing the three highest priority technologies, as ranked by the Joint DOE-DoD Low Intrusion Technology Working Group: Infrared Imaging, Electromagnetic Coil, and Optically Stimulated Luminescence Autoradiography.

We also developed several technologies that support U.S. Government objectives to measure nuclear weapon attributes for arms control applications, including a special portable coincidence counter, a new neutron spectrometer system, and an electromagnetic coil device.

In response to a Grand Challenge issued by DOE/NN20 (the Office of Nonproliferation Research and Engineering), we led a team involving several DOE labs and universities to develop a new multi-collector system that will revolutionize mass spectrometry.

General Accounting Office (GAO) auditors made visits to two Former Soviet Union nuclear power plants and interviewed safety experts at the International Atomic Energy Agency's Conference on Strengthening Nuclear Safety in Eastern Europe. After these visits, the GAO wrote in report, issued April 2000, that "U.S. assistance had a direct impact on improving safety." The GAO's assessment is a direct result of the Laboratory's strong involvement in strengthening nuclear safety in Eastern Europe.

PNNL led the establishment of International Development Centers under the Nuclear Cities Initiative and successfully established centers in the Russian nuclear cities of Zheleznogorsk and Snezhinsk, expediting the downsizing of the Russian nuclear weapons complex.

We also led the DOE project team that established the Inspection Information System for the Federal Nuclear Safety Authority in Russia, and we were a major contributor to the development of the Russian nuclear materials Federal Information System that keeps track of Russia's nuclear material.

Because of PNNL's recognized expertise in the international nuclear regulatory issues, the Office of Fissile Materials Disposition selected the Laboratory to lead Russian Gosatomnadzor (GAN) regulatory activities in support of the U.S. Government's initiatives to safely dispose excess fissile material previously used in weapons of mass destruction.

## 1.3 Effectiveness and Efficiency of Research Program Management

The outstanding nature of our research program management is demonstrated by the measures of success presented.

An important measure of DOE/NN confidence in PNNL research program management is manifested by the fact that Defense Nuclear Nonproliferation is the second largest single client of PNNL, with \$98 million in sales, even though the Laboratory is not under the new National Nuclear Security Administration. The projected sales of \$107 million for this fiscal year will make NN the single largest client of PNNL.

PNNL met all national and international milestones and deliverables in support of the Comprehensive Nuclear Test Ban Treaty. We also provided direct support as required by the State

Departments and DOE to solve U.S. requirements with North Korea and the United Nations/International Atomic Energy Agency Action Team in Iraq.

Because the Laboratory effectively managed the Russian Reactor Safety Program, DOE endorsed the selection of a PNNL staff member to act as the NN-30 Deputy Manager for five months during DOE's transition to a new NN-30 management team. A letter of appreciation from the manager of NN-30 indicated that the staff member's "personal commitment, as well as PNNL's, are certainly extraordinary" endorsing PNNL's leadership of the program for the foreseeable future. This endorsement came after Congress and DOE senior management scrutinized the program.

PNNL coordinated the successful demonstration to Russian Minatom security officials and weapons experts the U.S. Government's ability to make a broad series of radiation measurements on an actual U.S. nuclear weapons components without divulging classified information—solving a major current problem in U.S.-Russian negotiations.

PNNL was requested to manage two growing Material Protection Control & Accounting efforts: Russian Nuclear Material Consolidation and Conversion, and Institute for Physics and Power Engineering activities.

Finally, through a joint initiative between the University of Washington Henry M. Jackson School of International Studies and the PNNL Pacific Northwest Center for Global Security, and under the auspices of NN-1, the Laboratory signed a Memorandum of Understanding with the University of Washington to establish the Institute for Global and Regional Security Studies and contributed \$100,000 to underwrite the development of curricula and other collaborative activities.

## Office of Intelligence (DOE-IN)

To be successful we must be valued and trusted by our customer. For that reason, the ultimate indicator of our performance is customer satisfaction. An interview conducted with IN yielded the following comments:

PNNL performed "uniformly excellent work" in support of DOE's Office of Intelligence (IN). PNNL's analytical products routinely go directly to the Energy Secretary, the DOE Assistant Secretaries, and the National Security Council thereby having a direct impact on national security and on policy decisions.

The customer also indicated that PNNL detailees to IN based in Washington, D.C. provided an irreplaceable level of technical quality not available elsewhere in the federal government. They briefed the Energy Secretary on a daily basis and were also in routine communications with the staff that brief the President.

Finally, IN stated that it considers PNNL's work overall as "Outstanding" in analytical, as well as in science and technology products for IN and its external federal customers.

Examples of work cited include the following:

- Maintained a key master database on nuclear materials that supports the entire federal government and performed the vast majority of the analyses associated with this data. These analytical products have been described as "incredibly valuable" to the entire federal government.

- The accuracy of PNNL's prediction of the impact of the Y2K rollover on Russian production reactors was cited as a key accomplishment in FY2000. There was significant disagreement within the Intelligence Community (IC) regarding the possible impacts. DOE-IN was confident in PNNL's prediction because of the solid technical base upon which the prediction was based.
- Called upon to help two key members of the IC validate raw intelligence data before it is distributed throughout the IC. IN noted that only an organization that is highly trusted and extremely competent is asked to perform this function.
- Staff member on assignment at DOE-IN, a specialist in nuclear terrorism, helped to prepare the Secretary and his staff for foreign travel. This is considered very valuable and unique work in behalf of DOE.
- Complimented on its ability to consistently leverage the fundamental science base of the Laboratory into useable, high-value end products. PNNL's continuing work for the DOE-IN Special Technologies Program (STP), which serves the Intelligence Community, the Special Forces and Federal law-enforcement, was cited as resulting in cutting-edge, unique, robust products that meet user requirements. In addition, growth of PNNL's Intelligence Work for Others (IWFO) programs was noted as a positive contribution to DOE/IN's mission. A recent meeting with another government organization, wherein PNNL's work was cited as "excellent," was noted as an indicator of our performance for other federal organizations.

## 1.1 Quality of Science and Technology

The outstanding quality of the Science and Technology we deliver to our customer is best reflected by the results we have achieved, which are presented below.

**Nuclear Site Reports.** Provided quarterly analytical updates to the nuclear facilities site reports - one of our secure on-line products for DOE-HQ/IN. Maintained and strengthened legacy nuclear science and engineering talent to providing effective technical intelligence analyses on nuclear related topics. Hosted visits twice for IN Division chiefs and staff and provided an annual program review to IN-1 on the full scope of analytical products produced for IN. The Nuclear Nonproliferation Division (NND) representative praised our performance on FY2000 work scope during one of his visits to PNNL this year.

**Continued Strong Contributions To The DOE Special Technologies Program (STP).** Awarded four new Special Technologies research and development projects for FY2000 on behalf of IN's external clients. Well-recognized, principally through technology transfer/transition of projects to IN customers, both internal to DOE and other federal government organizations. Participated in an annual classified program review for STP attended by each participating DOE Laboratory, DOE HQ staff and invited representatives from other federal organizations (about 250-300 attendees). A measure of success this past year is the subsequent large number of recent visits to the Laboratory by various federal organizations interested in the research presented by PNNL at that annual review.

**A Successful Classified Laboratory Directed Research and Development (LDRD) Transition.** Successful conclusion of a classified LDRD has led to FY01 funding from a previously untapped program area within IN. Breakthrough in this new area of analysis was based on the quality and uniqueness of the ideas developed over the last two years of LDRD investigations, including technical liaison with other national laboratories. This marks the first time LDRD has

been applied in support of an IN analytical topic. DOE-IN has allocated FY2001 funding to support further analysis of that topic. Maintenance of our staff expertise and Laboratory legacy related to nuclear science and engineering is key to our ability to serve DOE and the Intelligence Community in such matters.

**Providing Technical Leadership For IO/TW Issues.** Requested to stand up a new DOE-HQ/IN program in Information Operations/Information Warfare (IO/TW), building upon PNNL developed visualization technologies and analytical capabilities. One of our senior experts on our Battelle Washington Office (BWO) staff was asked by IN-1 to serve as the Program Manager for this new initiative within IN.

## 1.2 Relevance to DOE Mission and National Needs

The relevance of our work to DOE Missions and needs is best articulated through the results presented below and reflect outstanding performance.

**Daily Intelligence Briefings To The Secretary.** Staff assigned to DOE-HQ/IN provided the daily intelligence briefs to the Energy Secretary and topical briefs to several assistant Secretaries and their staff, and provide technical liaison with the National Security Council. These staff who provide these briefings just received a Letter of Commendation from Secretary Richardson.

**Joint Atomic Energy Intelligence Committee (JAEIC) Visit To PNNL.** Hosted 13 members of the Joint Atomic Energy Intelligence Committee (JAEIC) in June 2000. The visit included a tour of the Hanford Site (B Reactor, etc.), capability briefings representing a broad cross section of the Laboratory including in-laboratory briefings in three EMSL laboratories, and a tour of the U.S. Navy facilities at Bangor, Washington, and the Marine Sciences Laboratory at Sequim, Washington. The JAEIC provided letters of commendation for key staff hosting the visit.

## 1.3 Effectiveness and Efficiency of Research Program Management

The outstanding nature of our research program management is demonstrated by the fact that we continued to provide programmatic and technical leadership for key ongoing and new programs in DOE/IN. Key performance indicators include:

**Appointment of a new PNNL STP Program Manager.** In early April, one of our senior staff assigned to DOE/IN in Washington, DC returned to the Laboratory in Richland from assignment supporting the STP program at DOE-HQ to assume technical leadership and program management responsibilities for the PNNL portion of that program.

**New IN Cyber Program Manager Appointed.** Also during May, a senior member of our staff assigned to DOE-HQ/IN, was appointed Program Manager by the Director, IN, for a new initiative for information technologies and network integrity issues. This program will provide additional funding to PNNL of over \$1 million/year. These new funds will go to support initiation of the program throughout the DOE Laboratories complex in FY2001, including PNNL.

**PNNL Initiates Planning For 2nd Phase SCIF Expansion.** With the growth in both DOE and IWFO analysis tasks during FY2000 and forecasted growth in FY2001 and beyond, the Special Programs Sector has initiated an investment plan for expanding the area of our current SCIF by about 2/3s in FY2001. An initial engineering design and detailed cost estimate task has been initiated to support this facilities expansion effort.

## Office of Counterintelligence (DOE-CN)

To be successful we must be valued and trusted by our customer. For that reason, the ultimate indicator of our performance is customer satisfaction. The outstanding nature of our performance is demonstrated by the Outstanding Performance Rating we received during a July 2000 meeting with Ed Curran (CN-1), Debbie Trader (DOE-RL), and Mike Kluse (PNNL).

PNNL has developed a Counterintelligence (CI) program that services all components within the Laboratory. It has a defined mission to both enhance DOE national CI program objectives and to support the local scientific community through the detection, assessment, and neutralization of foreign intelligence services and organizations that are targeting Laboratory personnel, technology, facilities, and activities. During FY2000, the PNNL CI Organization made outstanding strides in achieving an effective and efficient operation founded on the key functional areas of CI awareness, briefings and debriefings of staff, threat and risk assessments, investigations and operations, and CI cyber security. It utilized a team approach to address CI issues throughout the entire PNNL-Hanford-Richland Operations (RL) Office territory, synchronized by an annual "Master Plan" that defines a common mission for each RL CI entity. The expert and dedicated staff assigned to PNNL's CI Organization are highly regarded by DOE's Office of Counterintelligence (OCI) and its partner agencies within the Intelligence Community.

### 1.1 Quality of Science and Technology

The outstanding quality of the Science and Technology we deliver to our customer is best reflected by the results we have achieved, which are presented below.

- Executed DOE-CN's three largest programs
- Directed to assume leadership of all Hanford Contractors' CI Programs.

### 1.2 Relevance to DOE Missions and National Needs

The relevance of our work to DOE Missions and needs is best articulated through the results presented below and reflect outstanding performance.

- Directly impacted DOE's goal of protecting sensitive information and technologies from foreign exploitation
- All programs implemented across DOE Complex and tightly linked to Federal Law Enforcement and Investigative Agencies

### 1.3 Effectiveness and Efficiency of Research Program Management

The outstanding nature of our research program management is demonstrated by the Outstanding Performance Rating we received during a July 2000 meeting with Ed Curran (CN-1), Debbie Trader (DOE-RL), and Mike Kluse (PNNL).

## Energy Mission

The Energy Mission area contributes to the Laboratory's Critical Outcomes through the development of knowledge and technology aimed at solving some of the nation's most pressing energy generation, energy efficiency and environmental quality issues. With respect to the DOE's R&D

Portfolio, which outlines DOE's approach in addressing the principal national energy R&D issues, PNNL contributes critical science and technology to the following areas:

- The development of clean and efficient vehicle technologies
- The development of new advanced power systems
- The development of new technologies for efficient and affordable buildings
- The development of technology for efficient and productive industrial energy use

In the development of the Laboratory's Public Energy Sector strategy, the Sector leadership team establishes strategic goals and objectives, and matches those with capability and program development activities organized as focused multiyear technical thrusts. Public Energy Sector thrusts are aimed at developing major new programs from EE/RE and FE, generally in the form of collaborative R&D programs with industry. The Sector aims to simultaneously develop key technical capabilities that align PNNL's long-term technical agenda with DOE's R&D portfolio, and to further aid DOE in lowering the technical risk to U.S. industry in the adoption and implementation of energy efficient technologies through our technical work.

The Public Energy Sector is taking the following actions on behalf of the Laboratory to achieve performance toward the Laboratory's Critical Outcomes:

1. Providing DOE EE/RE and FE with leadership and organized industrial participation in programs involving technologies in energy generation and energy utilization. Targeted industrial sectors include:
  - Automotive and heavy truck manufacturers and suppliers
  - Advanced energy system developers
  - Building technology and equipment manufacturers
  - Energy intensive manufacturing and processing industries
2. Attaining leadership roles with the Assistant Secretaries for EE/RE and FE in targeted DOE initiatives:
  - Solid-State Energy Conversion Alliance (FE)
  - Northwest Alliance for Transportation Technology (EE)
  - 21<sup>st</sup> Century Truck (EE)
3. Establishing PNNL as a thought leader in DOE programs through strategic hiring of nationally recognized leaders in key technical fields. Strategic hires have been added to staff in the following areas in FY2000:
  - Advanced fuel cell technology (2)
  - Applied catalysis (1)
  - Automotive/truck technology (1: BMI DOE Sector)
  - Program development in power technology and distributed generation (1)
4. Establishing growth in key EE/RE and FE programs through technical excellence in research and development, with particular emphasis in technical thrust areas:
  - Light Weight Automotive and Heavy Truck Structures
  - Solid-Oxide Fuel Cell Systems for Automotive/Truck Applications and Stationary Power Generation for a Distributed System

- Intelligent Buildings Technology
- Computational Engineering and Simulation

The implementation of the Public Energy Sector strategy currently revolves around the activities in four active thrust areas. These thrusts have been selected for long-term program development and capability investment on the basis of being critical to DOE missions, having high potential for national leadership roles for PNNL, and for their importance in supporting and underpinning the Laboratory's technical competencies in the energy arena. In addition to the activities within thrust areas, there are numerous other dimensions to strategy development and management of ongoing programs that are covered outside the context of these thrusts. The four active thrust areas are:

**Advanced Fuel Cell Technology Thrust** – This thrust was established in mid-FY1998 to build on the long-standing PNNL strength in fuel cell materials research, and it aligns the Laboratory's technical strategy with the DOE R&D agenda for the development of high efficiency advanced energy systems. The thrust expands the Laboratory's niche capabilities in ceramic materials and solid-oxide fuel cell component technologies into a systems engineering framework. The long-term outcome of the thrust will be to establish PNNL as a preeminent institution in the design, development and demonstration of advanced planar designs of SOFC technology, and to aid industry in the transition of that technology into cost effective power systems for both transportation and stationary applications.

**Lightweight Transportation Materials Thrust** – The Lightweight Transportation Materials thrust began in FY1997 and was designed to expand PNNL strengths in materials science, metallurgy, and computational engineering. Specifically, the thrust was aimed at expanding capabilities and industrial relationships in lightweight automotive structure development, created during the 1990's under EE/OTT, USCAR and PNGV programs. The expansion of the technical agenda was aimed at providing solutions to a host of cost and manufacturing process issues that have inhibited the auto industry from adopting light metal structures for mass-produced vehicles. The thrust formed the technical basis of a joint DOE/OTT and PNNL initiative called the Northwest Alliance for Transportation Technology (NATT). The goals and objectives of NATT and the Lightweight Transportation Materials thrust align with the DOE R&D agenda in the development of clean and efficient vehicles. The focus of this thrust is presently expanding from light metal automotive structure applications into light truck/SUV and heavy vehicle applications.

**Intelligent Buildings Technology Thrust** – The Laboratory has had a long programmatic relationship with the EE/RE Office of Building Technology Systems (BTS). This research supports the development of codes and standards for building technologies, supports the Federal Energy Management Program, and provides outreach, market transformation and technology transfer support to DOE, states agencies, and industry for advanced building support systems (c.f. HVAC and lighting). The Intelligent Buildings Technology thrust is aimed at exploiting the Laboratory's energy policy and energy engineering experience in the development of new program directions both for BTS and PNNL. The thrust aims to generate industry interest, a broader DOE agenda, and technical capability in new system concepts to optimize, analyze and prognosticate performance in energy intensive building support systems.

**Virtual Manufacturing and Engineering Simulation Thrust** – High performance computational scientific and engineering modeling has been identified as a critical success factor for PNNL and is a specific area for expansion with respect to the public and private Energy Sector programs.

This thrust area combines high performance computing, advanced applications in computational engineering/materials science, and targeted development of simulation methods and design tools to support other thrusts and initiatives. Other supported thrusts and initiatives include the fuel cell technology thrust, lightweight automotive materials thrust, automotive and truck emissions system development, the Advanced Computational Sciences Initiative, and a host of industrial technology applications key to DOE's Energy R&D agenda. The aim of the thrust is to development staff capabilities and make key and strategic hires to significantly improve the overall technical acumen of our staff, as well to provide state-of-the-art computing facilities and engineering software for use in various new applications.

Our progress in these thrust areas as well as on the key actions we have identified demonstrates **Outstanding** performance.

Many of the indicators we use to determine our level of performance and predict how our customer will view our performance transcend one or more of the four key objectives identified in the Performance Evaluation and Fee Agreement. For that reason, our results are presented instead in sections. Each section title describes, to the degree possible, key objective or objectives to which the indicators correlate. For example, evidence of the effectiveness and efficiency of our research program management in this mission area is provided in both the section discussing quality as well as relevancy. The section headers are meant to denote this fact. It should also be noted that the Objective entitled, "Success in Constructing and Operating Research Facilities", is not applicable to this mission area.

## Office of Fossil Energy (FE)

### 1.1 Quality of Science and Technology and Effective Program Management

The Laboratory's progress toward this objective is exemplified by several significant accomplishments developed within our key thrusts, specifically that of the Advanced Fuel Cell Technology.

The various fuel cell programs managed by the Office of Fossil Energy have provided funding to PNNL over a period of more than 15 years. These programs have been largely focused on basic physical properties, chemistry and ion transport phenomena for the materials used in various solid-oxide fuel cell designs. This long-standing research foundation in basic materials chemistry, solid-state physical inorganic and electrochemistry, combined with a considerable depth in ceramics, gave rise in FY1999 - FY2000 to an opportunity to help develop and manage a new national fuel cell program supported by FE. This program, organized under a government/industry collaborative partnership called the Solid-State Energy Conversion Alliance (SECA), focuses on the development of practical and cost effective modular designs of planar solid-oxide fuel cell systems.

In anticipation of the changing direction of FE's fuel cell program the Public Energy Sector formulated a technical thrust with an associated capability development initiative aimed at advanced fuel cell technology. The thrust was designed to expand our basic chemistry and materials research capabilities into a program in integrated SOFC stack design, fabrication and testing. In FY2000, PNNL began a Laboratory-level LDRD initiative in fuel cell development. Late in FY2000, SECA programmatic funding was initiated at PNNL for a CRADA with Delphi Automotive Systems. This CRADA was aimed at the development of a solid-oxide fuel cell stack for automotive applications.

To date, several significant technical outcomes have been achieved in these programs and these can be used to highlight the Laboratory's outstanding performance in the execution of research over this relatively short period of time. These accomplishments include:

- The conceptualization, fabrication and initial testing of a new planar solid-oxide fuel cell design. This single-cell stack was shown to provide acceptable initial performance and power density, albeit with a minor flaw in the glass seals. The design has been developed jointly by PNNL and Delphi and incorporates:
  - Novel metal components that aim to provide better thermal management and better performance in rapid start up as compared to conventional designs
  - Greater mechanical compliance in fabrication
  - Structures with potential for in-stack reformation of fuel
  - Better electrical interconnects
- The development of computational modeling tools for the design, optimization and fabrication of advanced planar fuel cells. These tools and computational methods represent forefront applications for the design optimization of planar solid oxide components. Technical achievements include:
  - Computational fluid dynamics models and methods to evaluate air and fuel flow through the stack system and thermal transport
  - Finite element models and tools to assess stress and thermo mechanical behavior of materials in these high temperature applications
  - Electrochemical modeling to assess issues of heat generation, fuel utilization and optimum configuration of active surfaces

Further achievements in fuel cell development are forthcoming in the first several quarters of FY01 associated with the demonstration and testing of multi-cell stacks of the PNNL/Delphi design, and performance evaluation of the technology during thermal cycling. Other significant technical advances have been made in FY2000 associated with the development and demonstration of forefront catalytic microchannel fuel reformation technology for fuel cells, supported by EE/OTT.

Overall, the Sector management team views the technical quality of PNNL's contributions in fuel cell research to be Outstanding and an excellent example of the Laboratory's ability to quickly adapt its research agenda to changing DOE mission needs. However, there are numerous challenges to overcome in our future research activities as SECA broadens its agenda and incorporates other national laboratories and industrial teams. Principal among anticipated challenges will be the incorporation of design engineering rigor to our approach in developing and evaluating fuel cell systems. ESTD has incorporated an aggressive program to make several strategic hires to aid in our transition to systems-level integration of fuel cell technology. Three strategic hires were accomplished in FY2000, two of whom have extensive industrial experience in solid-oxide fuel cell development and the engineering of these systems, and the third is a senior hire in the area of applied catalysis with experience in reformation catalysis relevant to fuel cell technology.

## **1.2 Relevance to DOE Mission National Needs and Effective Program Management**

The relevance of our research to DOE mission needs are best illustrated through our activities in developing new programs in collaboration with our DOE program counterparts. We are ex-

tremely active in creating new program opportunities for the national laboratories in the energy arena. This is a reasonably complex challenge given the programmatic imperative for industrial collaboration involving the bulk of EE/RE and FE programs.

In FY2000, the Laboratory initiated an important national program development activity in collaboration with our DOE FE Energy Mission client. This activity was the development of the Solid-State Energy Conversion Alliance (SECA) with FE. SECA represents a new government/industry collaborative research program in fuel cell technology development, which PNNL and NETL will co-manage. While this activity is not the sole concern for the Laboratory in renewing our programs and insuring their relevance to DOE missions, it provides a good illustration of the importance and impact of the Laboratory's contribution in guiding the programs in the DOE portfolio. The Laboratory is currently fostering several lower-level thrusts and Laboratory initiatives that will be important additions to our FE programs in the future.

#### Creating Relevant Programs for the Office of Fossil Energy: Solid-State Energy Conversion Alliance (SECA)

During the middle portion of the 1990's, the Office of Fossil Energy suffered through significant decreases in its research and development program budgets. In response to heavy congressional criticism of its programmatic content, FE's management team formulated a new strategy aimed at developing the next generation of forefront technologies for clean and affordable power production from fossil fuel feedstocks. This strategy was known as Vision-21, and while heavily modified relative to the initial versions of the document, Vision-21 remains the strategy framework for FE programs.

In FY1999, FE leadership requested of PNNL aid in rethinking its technical approach within its fuel cell programs in order to gain a better level of consistency with Vision-21 goals. In the process of providing technical assistance to FE, it became apparent to PNNL management that congressional support for ongoing fuel cell research was extremely weak without a serious commitment by FE and industry to aggressively pursue a practical and cost effective implementation of the technology. During the latter months of FY1999, the Laboratory's Public Energy Sector, and BMI's Commercial Automotive and Private Energy Sectors initiated discussions with industry to probe interest in the most promising of the fuel cell technologies, those based on Proton Exchange Membrane (PEM) technology and solid-oxide (SOFC) technology. These discussions resulted in the generation of a level of consensus among the Sector leadership that a new approach to SOFC technology would generate a high degree of interest in industry and in congress. The approach was one based on firm cost constraints for the initial capital cost per unit energy, and the manufacture of the technology through mass customization and modular design. These ideas were formulated into a proposition to FE and NETL for the creation of a new SOFC program organized around vertical industrial consortia not unlike the structure used in the OTT NATT program.

As a result, the Solid-State Energy Conversion Alliance (SECA) has been developed as a public/private alliance, organized and managed by FE/NETL and PNNL, funding advanced fuel cell technology in the development of the next generation of low cost solid-oxide fuel cell systems. These systems are targeted on the transportation, mobile/military power and stationary power markets. The organization of SECA is consistent with the following:

- SECA and its national laboratory and industrial technical teams are governed by a collaborative development agreement between DOE and a set of systems developers (industrial teams) that

have committed to commercial deployment of a common fuel cell module adapted for specific targeted markets, system costs, and common specifications.

- DOE and other participating Federal agencies are joined through a Memorandum(s) of Agreement committing to co-funding development and a common commitment to overall management by DOE Fossil Energy.
- FE/NETL serve as the executive – managing member for the alliance, acting on behalf of all the Federal agencies engaged in SECA.
- PNNL and NETL will co-manage a horizontal core technology program based at the DOE national laboratories and universities, the aim of which is to provide technology solutions to all members of SECA for common materials and subsystem components challenges.

SECA was launched on June 2, 2000 through an industry workshop in Baltimore, Maryland, organized by PNNL and NETL. The workshop introduced the working assumptions of SECA to 250 interested industrial, national laboratory, and university researchers. The meeting was also designed to develop a consensus on the technical barriers which would have to be overcome in order to achieve SECA's long-term goals.

The initial FY2000 effort to develop the SECA concept and program plan was funded from NETL program management and planning funding with \$2.8 million in support to PNNL. FY2001 funding for SECA is estimated to be \$24M, largely accumulated through reprogramming by FE and NETL, with \$10M in funding provided by congress for the start of the new program. PNNL's funding for FY2001 is anticipated to be between \$5.0M and \$6.5M for SECA Core Program, Delphi CRADA and other FE fuel cell programs, demonstrating Outstanding performance

## **Office of Energy Efficiency and Renewable Energy (DOE-EE/RE)**

### **1.1 Quality of Science and Technology and Effective Program Management**

The Laboratory's progress toward this objective is exemplified by several significant accomplishments developed within our key thrusts, specifically within the Lightweight Transportation Materials thrusts.

In 1997, in partnership with the EE/RE Office of Transportation Technology (OTT), PNNL set out to form the Northwest Alliance for Transportation Technology (NATT). The objective of NATT was the linking of research capabilities within the national laboratories and universities with the automobile industry and light metal producers. This research alliance was formed in an effort to lower the cost and manufacturing process barriers in the incorporation of aluminum and other light metals into the mass production of automobiles. Over time, the scope of NATT has evolved and now includes research and development in a broad range of technologies in addition to light metal structures, including diesel emissions reduction technologies and automobile glass manufacturing processes.

During the initial phases of NATT, programs included research in technologies to reduce raw materials cost for automotive applications, development of advanced forming processes that allow for lower manufacturing cost for complex structures, and technologies that enable the incorporation of more aluminum, magnesium, and composite materials to automotive systems.

There are numerous examples among the technical outcomes from the initial phases of the NATT program that provide good illustrations of technical excellence. Those that have resulted in significant outcomes during the past year include:

Development of a process technology for the continuous thermal reduction of magnesium.

- NATT and Alcoa have participated in a major effort to develop a revolutionary new low-cost process for the production of primary magnesium.
- The process has the potential of reducing the cost of magnesium by as much as 25%
- The technology would position Alcoa as the world's low-cost producer of magnesium
- Pilot scale demonstration is currently underway
- Will produce positive and significant impacts for the cost effectiveness for magnesium incorporation in automotive and truck structures.

Development of lightweight automobile glass and manufacturing process methods

- A highly successful collaborative project with PPG and Visteon Automotive Systems
- Developed advanced measurement technologies for glass properties, stress and strength evaluation
- Computational modeling was used to develop predictive analytical tools for design
- Resulted in 30% weight reduction in windshield and side body glasses
- Technology meets targets for structural integrity, cost, and crash worthiness

Lightweight Pick-Up/Sport Utility frame development

- One half of all new vehicle sales in the U.S. are light trucks (PU), sport-utility vehicles (SUV) and vans
- NATT recognized the need for weight reduction technologies for PU/SUVs and funded studies to determine the feasibility of building a lightweight aluminum frame for PU/SUVs
- Lightweight frame of aluminum and steel will significantly reduce the vehicle weight at very low cost penalty
- NATT is now in the process of funding the optimization of the design and fabrication of actual vehicle prototypes (Automaker/Tier-One Suppliers)

In addition to these light metal and lightweight automobile structure projects, PNNL is recognized as a leading developer of basic science and application technology in automobile emissions reduction technology and fuel reformation systems for transportation applications.

We believe that PNNL's leadership in NATT and the technical progress made in these programs represents an *outstanding* contribution to the automotive manufacturing and light metal process industries. These accomplishments represent important technical outcomes in support of DOE's Energy Mission. The challenges faced by PNNL and its management in the next phases of the Laboratory's thrust in lightweight transportation materials are associated with creating a new set of capabilities aligned with the needs of the heavy truck manufacturing industry. This is due in large part by the formulation of a new multiagency initiative in truck technology, dubbed 21st Century Truck, the technical agenda for which will converge with that of NATT under EE/RE Office of Transportation Technology leadership. The BMI DOE Sector has accomplished one

strategic hire in the area of heavy truck and emissions reduction technology in support of NATT and 21<sup>st</sup> Century Truck. This individual will be detailed to OTT/Office of Heavy Vehicle Technology for program development activities.

## 1.2 Relevance to DOE Mission National Needs and Effective Program Management

The relevance of our research to DOE mission needs are best illustrated through our activities in developing new programs in collaboration with our DOE program counterparts. We are extremely active in creating new program opportunities for the national laboratories in the energy arena. This is a reasonably complex challenge given the programmatic imperative for industrial collaboration involving the bulk of EE/RE programs.

In FY2000, the Laboratory and Public Energy Sector initiated an important national program development activity in collaboration with our DOE-EE/RE Energy Mission client. The activity is the continued development of NATT with EE/RE OTT into its next phase, heavy truck technology, and development of the programmatic relationship between NATT and a new multiagency initiative, 21<sup>st</sup> Century Truck. While this activity is not the sole concern for the Laboratory in renewing our programs and insuring their relevance to DOE missions, it provides a good illustration of the importance and impact of the Laboratory's contribution in guiding the programs in the DOE portfolio. The Laboratory is currently fostering several lower-level thrusts and Laboratory initiatives that will be important additions to our EE/RE programs in the future.

### Creating Relevance in Office of Transportation Technology Programs: The Evolution of the Northwest Alliance for Transportation Technology

Working with the Office of Transportation Technology, NATT has funded over 50 projects in lightweight metal forming and emission reduction technology since its creation in 1997. Spearheaded by PNNL, NATT was originally organized around technical goals that aimed to develop practical metal processing technology. These technologies were focused on enabling the automobile manufacturers to more easily and cost effectively introduce light metal structures into mass produced vehicles. The projects funded by NATT over the first three years have involved researchers from industry, national laboratories and universities, and NATT is responsible for developing valuable technology and aiding in reducing the cost in various manufacturing operations. It is worth noting that these projects are peer reviewed by DOE and industry to demonstrate progress and relevance to the overall objective of increased vehicle fuel efficiency and reduced emissions.

NATT and the associated PNNL OTT programs have made several important transitions during the past year. NATT, as a program with active automobile manufacturer and supplier contingents, has demonstrated its viability as an ongoing budget item within OTT through the support and enthusiasm of the industry participants and DOE management. PNNL and OTT management are supportive and cooperative relative to the program goals, objectives and project funding levels. In addition, PNNL Public Energy Sectors managers actively participate in OTT priority setting workshops and road mapping exercises associated with PNGV and heavy truck programs.

At the outset of FY2000, NATT faced some significant challenges associated with its mission. PNGV has become a mature program area with declining budgets in areas where NATT provides significant support. As well, a large portion of the first phase of projects within NATT were moving into the terminal stages of funding and new projects and technical goals were needed. In

response, PNNL management and key technical staff have become involved in the formulation of strategy within a new multiagency initiative called 21<sup>st</sup> Century Truck. It is anticipated that DOE OTT will become the managing organization for this initiative within the Federal Agencies. PNNL has engaged Northwest heavy truck manufactures PACCAR and Freightliner in dialog about energy efficiency needs surrounding heavy truck technologies, and along with Detroit Diesel and Caterpillar, PNNL has developed new NATT and OTT programs in heavy truck emissions reduction technology relevant to OTT goals, as well as those of 21<sup>st</sup> Century Truck. Battelle's DOE Sector has also recently made a strategic hire of an individual from the heavy vehicle industry to aid OTT management in formulating strategy within 21<sup>st</sup> Century Truck and NATT.

The aim of the Public Energy Sector is to aggressively evaluate the relevance and impact of its science and technology programs on a regular basis. The Sector will make concerted efforts with its DOE clients to redeploy those capabilities and program funds when opportunity exists for new and significant contributions to the DOE Mission outcomes. The Program development activities associated with OTT/NATT and the FE/SECA are excellent examples of dynamic program development in DOE and PNNL's best interest.

The overall performance rating for this Critical Outcome is determined by comparing the Total value in Table 1.1 below, to the rating scale in Table 1.2.

**Table 1.1. Scientific and Technological Excellence Evaluation Score Calculation**

HQ Program Office	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
Office of Science	Outstanding	5.0	30%	1.5	
Assistant Secretary for Environmental Management	Excellent	4.0	25%	1.0	
Office of Nonproliferation and National Security	Outstanding	5.0	15%	0.75	
Office of Intelligence	Outstanding	5.0	5%	0.25	
Office of Counterintelligence	Outstanding	5.0	5%	0.25	
Assistant Secretary for Energy Efficiency and Renewable Energy	Outstanding	5.0	15%	0.75	
Assistant Secretary for Fossil Energy	Outstanding	5.0	5%	0.25	
				Overall Outcome Total	4.8

**Table 1.2. Scientific and Technological Excellence Critical Outcome Final Rating**

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	<1.5
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

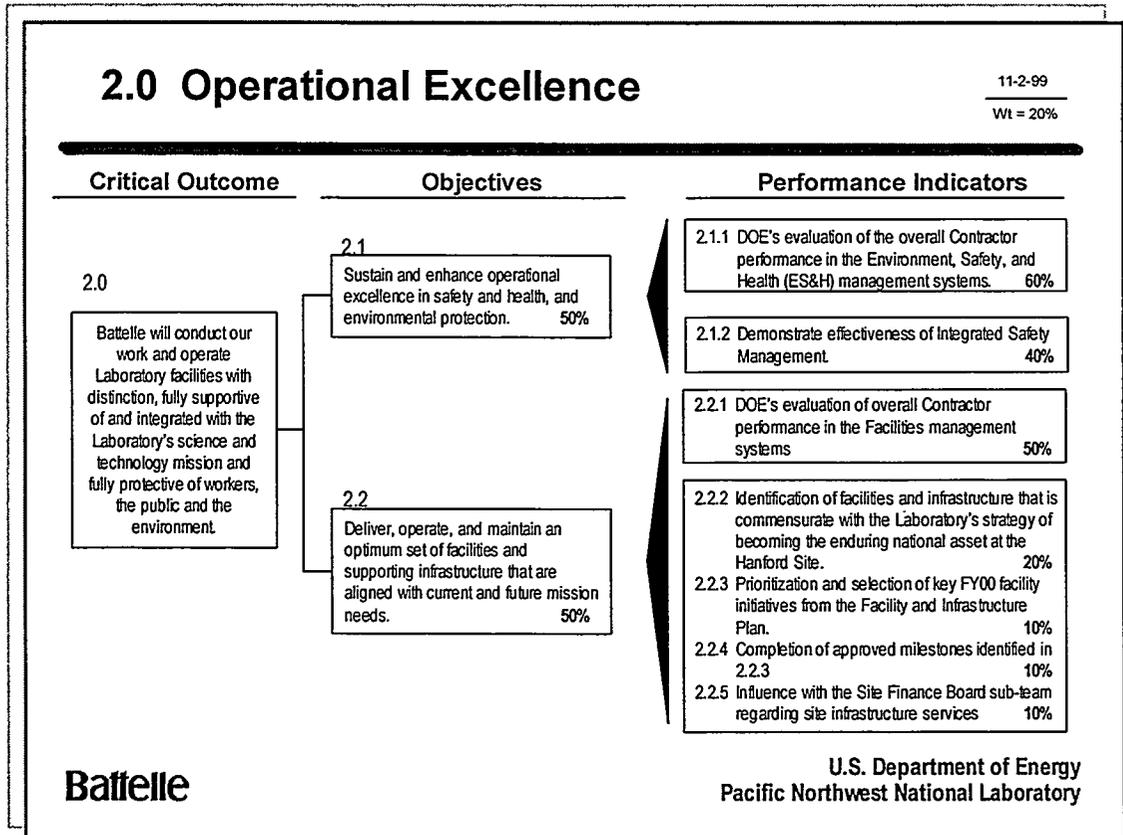


## 2.0 Operational Excellence

The Department of Energy's Strategic Plan communicates a strong and very unambiguous commitment to operations and to ensuring the health and safety of our work force and the public, and the protection of the environment.

The Laboratory recognizes that strong scientific and technical performance can not be accomplished at the expense of ES&H or operational performance. In fact, strong ES&H and operational performance is seen as an enabler of the execution of the Laboratory's mission related work. For these reasons, and in partnership with the DOE, the Laboratory has established the Operational Excellence Critical Outcome and its supporting objectives to guide our improvement efforts and performance indicators to monitor our progress toward our goals.

The Operational Excellence Critical Outcome Tree, detailing the Critical Outcome and its' supporting Objectives and Performance Indicators, is presented below.



## Summary

Pacific Northwest National Laboratory continues to conduct work and operate facilities with distinction and in a manner that is supportive of the Laboratory's science and technology mission. We have made significant investments over the past seven years to integrate sound safety and environmental management practices into daily operations. In addition, we have focused on the set of facilities and infrastructure that will be needed to assure that the world-class science and technology produced by PNNL will be supported by world-class facilities and infrastructure.

As a member of the Hanford contractor family, we actively participated on a joint Hanford contractor review team tasked to provide cost analysis reports to the Hanford Site Management Board (SMB). This team was very successful and is a further indication of PNNL's desire to become a strong component of the Hanford Site's future.

The Laboratory's performance with respect to occupational safety and health, radiological control, waste management, and environmental protection are strong. A comparative analysis of OSHA statistics indicated that PNNL's performance is better than the average for other R&D organizations. Staff continue to perform very well with respect to the OSHA indicators for Lost Workday Case Rate, Total Recordable Case Rate, and Lost Workday Incident Rate. These factors demonstrate that the Laboratory continues to achieve the desired outcomes of its Integrated Safety Management Program.

An internal investigation of waste management activities in the 331 facility resulted in the discovery of four missing waste containers. The missing waste containers consisted of approximately 2.5 gallons of waste, 80% of which was water. This event was reviewed by the DOE IG, the Washington State Department of Ecology (WDOE) and EPA Region X Criminal Division and was documented in ORPS reports. During the review it was determined that the PNNL hazardous waste management processes meet regulatory requirements. As part of our corrective actions and the lessons learned from this review we have implemented improvements to our waste management self-assessment process. To date, Ecology has taken no action, and has indicated a willingness to review the facts and issue a closure letter. Battelle made a proactive call to the Tri-City Herald after the final ORPS report was placed in the DOE Reading Room. The Herald ran a story on the missing waste containers in late September. The story has not generated any additional public or regulator interest. Although a serious incident, this demonstrates the Laboratory's ability to effectively manage events that could have significant regulatory and/or public impact.

Performance against the Facility management system Memoranda of Understanding (MOUs) with our DOE-RL counterparts resulted in increased emphasis on the effective and efficient delivery of products and services to Laboratory staff. Noteworthy accomplishments among the Facility management systems included the Emergency Preparedness (EP) management system receiving high marks from DOE-RL for Exercise "Bold Endeavor." In addition, the Facility Acquisition and Disposition (FAD) management system completed Building Life Cycle Plans (BLCP), including Condition Assessments for 16 facilities. The completed condition assessments covered 65% of all buildings and represent 85% to 90% of the content of the Building Life Cycle Planning document. This effort represents significant progress towards improving the level of maturity for evaluating facilities and their life cycle needs. Staff use of the Standards Based Management System continues to increase - up 7% over FY1999 - but the rate of increase flattened somewhat. In addition, the number of SBMS subject areas appears to be decreasing as we consolidate to reduce redundancy.

PNNL reported a security incident in July 2000 that occurred during the Site wide Hanford Fire emergency. Following consultation with DOE-RL PNNL initiated a security stand-down in response to this incident involving the control and protection of a classified document. The stand-down was initiated to ensure that the Laboratory fully maintains our capability to conduct classified work to the highest standards. A team of senior staff from across the Laboratory was formed to examine the status of the Laboratory's classified work, develop lessons learned, and determine the actions necessary to formalize restart criteria. The multiple actions taken during the stand-down included reinforcement of the awareness of all staff and management, strengthening the Roles, Responsibilities, Accountabilities, and Authority (R2A2s) associated with classified work, emphasizing the reporting process for such incidents, and sharing lessons learned. The implementation of these actions revealed several additional opportunities for improvement. Completion of the actions will help to assure that classified work activities continue to be conducted in a manner that not only meets all security objectives but also enhances our ability to achieve program objectives.

The completion and issuance of the FY2000 Facility and Infrastructure Strategic Plan on December 30, 1999, reflected a significant improvement over previous plans primarily due to extensive partnering between Facilities Directorate and all research divisions. The plan also improved alignment with facility and infrastructure needs and the strategic direction of research initiatives and served to enhance our focus on developing and maintaining the facilities and infrastructure that will carry PNNL into the 21<sup>st</sup> Century. PNNL completed the Limited Areas Island (LAI) facility modifications to the EESB building according to schedule, however, based on the request and the benefits to be realized, we delayed the moves necessary to activate the LAI phase 2. This action was intentionally delayed by PNNL to permit the acquisition of additional office space. Additionally, the completion of the OC3 System Upgrade, a milestone of great strategic significance for the research missions of the Laboratory, will not be realized until early FY2001. The completion of the milestones was delayed due to conflicts between service providers which were second tier subcontractors to PNNL but which PNNL did not have direct control over. The delays encountered have detracted from the overall schedule performance however, the actions initiated by PNNL demonstrated leadership towards achieving the higher strategic value.

Based on the Objectives that support this Critical Outcome we believe our performance rating is Outstanding.

## **2.1 Sustain and Enhance Operational Excellence in Safety, Health and Environmental Protection**

### **Results**

In FY2000, the Laboratory focused on, two (2) key aspects of ensuring operational excellence in ES&H; overall effectiveness and performance of the ES&H-related management systems, which includes Q&PM and demonstration of the effectiveness of PNNL's Integrated Safety Management system.

The bases for determining performance of the management systems were Memoranda of Understanding (MOUs) that were developed jointly by the DOE-RL point-of-contact and the Laboratory management system owner. Noteworthy accomplishments in the Facility Safety management system included the development and implementation of the RPL 1999 SAR/TSRs. The Environmental Management Services management system successfully negotiated unique umbrella

type permit for research operation at EMSL. This approach eliminated the need to obtain new permits for every change in the operational envelope. Further, the PNNL's Project Management system was approved by the DOE-RL Contracting Officer and findings from An Independent Review of Recent Project Management System Assessments indicated that of the PNNL management systems reviewed, "... this management system appears to be the most mature and the one that has invested the most effort in assessing itself and using the results of assessments to make improvements".

A comparative analysis of our ES&H Lagging Indicators against OSHA statistics indicated that PNNL's performance is better than the average for other R&D organizations. Staff continue to perform very well with respect to the OSHA indicators for Lost Workday Case Rate, Total Recordable Case Rate, and Lost Workday Incident Rate.

An internal investigation of waste management activities in the 331 facility resulted in the discovery of four missing waste containers. The missing waste containers consisted of approximately 2.5 gallons of waste, 80% of which was water. This event was reviewed by the DOE IG, the Washington State Department of Ecology (WDOE) and EPA Region X Criminal Division and was documented in ORPS reports. During the review it was determined that the PNNL hazardous waste management processes meet regulatory requirements. As part of our corrective actions and the lessons learned from this review we have implemented improvements to our waste management self-assessment process. To date, Ecology has taken no action, and has indicated a willingness to review the facts and issue a closure letter. Battelle made a proactive call to the Tri-City Herald after the final ORPS report was placed in the DOE Reading Room. The Herald ran a story on the missing waste containers in late September. The story has not generated any additional public or regulator interest. Although a serious incident, this demonstrates the Laboratory's ability to effectively manage events that could have significant regulatory and/or public impact.

Our performance toward this Objective demonstrates the Laboratory's continuing ability to drive improvement in targeted areas while sustaining and even enhancing performance as a whole.

Based upon the performance indicators that support this objective, our rating for FY2000 is **Outstanding**.

## **Analysis**

DOE's evaluation of overall Contractor performance in the Environment, Safety and Health (ES&H) and selected Quality management systems. This indicator demonstrates the overall effectiveness of the Laboratory's ES&H and Quality management systems in the areas of compliance with applicable contractual requirements; effective and efficient delivery of products, services and systems; and continuous improvement of the ES&H system. PNNL continues to achieve outstanding progress toward full deployment of systems that are compliance with requirements and deliver effective and efficient products and services to support the mission of the Laboratory.

DOE-RL organizations will utilize PNNL's Self-Assessment results as the primary means for this performance evaluation. DOE-RL business management organizations may also utilize one or more of the following, in addition to Self-Assessment, in evaluating PNNL's performance on this indicator:

1. Operational awareness/daily oversight activities
2. For Cause Reviews
3. Other outside agency reviews
4. Annual 2-Week review

The bases for the scoring of this indicator were Memoranda of Understanding (MOUs) that were developed jointly by the DOE-RL point-of-contact and the Laboratory management system owner. Each MOU defined out how performance of the specific management system was to be evaluated and how the final score was determined. Overall performance for this indicator was determined by averaging the equally weighted scores of the individual management systems. Table 2.1 below, provides the evaluation scores for each of the management systems covered by this indicator. Highlights from the selected ES&H and Quality management system self-evaluations follow.

- Worker Safety & Health:
  - Five self-assessments were scheduled, with four being conducted. In addition two unscheduled self-assessments (the Beryllium and Time Sensitive Chemicals self-assessments are ongoing) were conducted which were both time and funding intensive. All corrective actions identified from self-assessments within FY2000 and scheduled for completion within FY2000 were completed early or on time.
- Facility Safety: RPL 1999 SAR/TSRs were developed and implemented
- Environmental Management Services:
  - Successfully negotiated unique umbrella type permit for research operation at EMSL. This approach eliminated the need to obtain new permits for every change in the operational envelope.
  - Reduce overall cost and waste volumes through implementation of operational wide efficiency assessment
- “An Independent oversight assessment concluded that work processes are fundamentally sound and the roles and responsibilities of the individuals completing the work processes are generally clear.”
- An internal investigation of waste management activities in the 331 facility resulted in the discovery of four missing waste containers. The missing waste containers consisted of approximately 2.5 gallons of waste, 80% of which was water. This event was reviewed by the DOE IG, the Washington State Department of Ecology (WDOE) and EPA Region X Criminal Division and was documented in ORPS reports. During the review it was determined that the PNNL hazardous waste management processes meet regulatory requirements. As part of our corrective actions and the lessons learned from this review we have implemented improvements to our waste management self-assessment process.
- Project Management:
  - The DOE-RL Contracting Officer approved PNNL’s Project Management System.
  - The FY2000 maturity assessment indicates improvement over FY1999 results in 6 of the 7 areas assessed.
  - The PMP Generator was introduced as a Laboratory-wide tool in late FY1999 and early FY2000.

- Findings from An Independent Review of Recent Project Management System Assessments. – “Based on the reviewers’ knowledge of PNNL’s management systems, this management system appears to be the most mature and the one that has invested the most effort in assessing itself and using the results of assessments to make improvements”.
- Standards Based Management System:
  - Laboratory-wide use of SBMS continues to increase, although at a slower rate than in previous years. FY2000 user sessions were up 7% above FY1999 figures.
  - The rate of use of SBMS among the research staff is up. Each of the Divisions shows a positive increase in the number of staff accessing SBMS.
  - As a result of consolidation of a number SBMS subject areas to reduce redundancy and increase the consistency and conciseness of the information, the total number of SBMS subject areas appears to be decreasing.
- Quality Management
  - DOE-RL accepted (approved) the Quality Assurance Program Update that addresses 10 CFR 830.120 and DOE O 414.1 using single program. DOE found the revision including the changes to the adequate and acceptable as delivered.

Compiled results of the management systems that support this Objective follow:

**Table 2.1.** Summary of Self-Evaluation Scores and Ratings for ES&H and Quality Management Systems

Management System	Rating	Grade
Environmental Management Services	4.9	Outstanding
Facility Safety	4.45	(High) Excellent
Integrated Environment, Safety, and Health (ES&H)	4.7	Outstanding
Radiological Control	4.64	Outstanding
Training and Qualification	5.0	Outstanding
Worker Safety and Health	4.45	(High) Excellent
Project Management	5.0	Outstanding
Quality Management	5.0	Outstanding
Standards-Based Management Systems (SBMS)	4.72	Outstanding
<b>Average</b>	<b>4.8</b>	<b>Outstanding</b>

**Demonstrate the effectiveness of Integrated Safety Management.** This indicator is a composite of Performance Measures designed to provide an overall picture of the effectiveness of Integrated Safety Management. The basis for the set of measures is the ISM effectiveness indicators developed by the DOE Safety Management Implementation Team (SMIT) and performance indicator 2.1.4 from the Battelle FY1999 Performance Evaluation and Fee Agreement.

ES&H personnel routinely monitor the performance of a series of Lagging Indicators, so called because they report data after the fact, as opposed to in-process. The composite of these indicators provides an overall indication of the health of the Laboratory’s Environment, Safety and Health program. Results indicate that the Laboratory is sustaining a high level of excellence in the protection of workers, the public, and the environment.

For FY2000, seven (7) of the eight (8) performance measures met or exceeded their specified level of performance. Performance against this indicator demonstrates that PNNL continues to achieve the desired outcomes of its Integrated Safety Management Program (IES&H Management System). Table 2.2 below, provides the results of the ES&H Lagging Indicators compared to the target (or specified level) for FY2000. Of note is the fact that Total Recordable Case Rate, Lost Workday Case Incident Rate, and Lost Workday Incident Rate are below the targets established.

Table 2.2. Comparison of PNNL Performance ES&H Lagging Indicators Against FY2000 Targets

Performance Measures	Target Level	Performance
Total Recordable Case Rate	<2.3 cases/200,000 work hours	2.0 cases/200,000 work hours
Lost Workday Case Incident Rate	<1.2 cases/200,000 work hours	0.9 cases/200,000 work hours
Lost Workday Incident Rate	<30.0 lost workdays/200,000 work hours	20.73 lost workdays/200,000 work hours
Reportable Occurrences of Release to the Environment	≤2 events	1 event
Percent of Employees with Required Training	≥95%	98.9%
Unplanned Dose	0 events	1 event
Spread of Contamination	<3 events	2 event
Loss of Source	0 losses	0 losses

## 2.2 Deliver, Operate and Maintain an Optimum Set of Facilities and Supporting Infrastructure that are Aligned with Current and Future Mission Needs

### Results

This objective has served to focus the Laboratory on the set of facilities and infrastructure that will be needed to assure that the world-class science and technology will be supported by world-class facilities and infrastructure. Further, one of the indicators that supports this objective is intended to engage PNNL in a greater level of participation in Hanford Site contractor activities.

Performance against the Facility management system Memoranda of Understanding (MOUs) resulted in increased emphasis on the effective and efficient delivery of products and services to Laboratory staff. Noteworthy accomplishments among the Facility management systems include an Emergency Preparedness (EP) review of corrective actions associated with the Plutonium Reclamation Facility (PRF) incident, and Exercise "Bold Endeavor" receiving high marks from DOE-RL. Facility Acquisition and Disposition (FAD) management system completed Building Life Cycle Plans (BLCP), including Condition Assessments for 16 facilities. The completed condition assessments covered 65% of all buildings and represent 85% to 90% of the content of the Building Life Cycle Planning document. This effort represents significant progress towards improving the level of maturity for evaluating facilities and their life cycle needs.

PNNL reported a security incident in July 2000 that occurred during the Site wide Hanford Fire emergency. Following consultation with DOE-RL PNNL initiated a security stand-down in response to this incident involving the control and protection of a classified document. The stand-down was initiated to ensure that the Laboratory fully maintains our capability to conduct classified work to the highest standards. A team of senior staff from across the Laboratory was

formed to examine the status of the Laboratory's classified work, develop lessons learned, and determine the actions necessary to formalize restart criteria. The multiple actions taken during the stand-down included reinforcement of the awareness of all staff and management, strengthening the Roles, Responsibilities, Accountabilities, and Authority (R2A2s) associated with classified work, emphasizing the reporting process for such incidents, and sharing lessons learned. The implementation of these actions revealed several additional opportunities for improvement. Completion of the actions will help to assure that classified work activities continue to be conducted in a manner that not only meets all security objectives but also enhances our ability to achieve program objectives.

The completion and issuance of the FY2000 Facility and Infrastructure Strategic Plan on December 30, 1999, reflected a significant improvement over previous plans primarily due to extensive partnering between the Facilities Directorate and all research divisions. The plan also improved alignment with facility and infrastructure needs and the strategic direction of research initiatives.

Five key milestones delineated in the Facility and Infrastructure Strategic Plan were selected for inclusion into the Laboratory-level Critical Outcomes. Specifically, PNNL completed the EESB Local Area Island facility modifications according to schedule, however, based on the request and the benefits to be realized, delayed the moves necessary to activate the LAI phase 2. Additionally, the OC3 System Upgrade, which was scheduled for completion in FY2000 and has great strategic significance for the research missions of the Laboratory, will be realized early in FY2001. The completion of the milestone was delayed due to conflicts between service providers which were second tier subcontractors to PNNL but which PNNL did not have direct control over.

PNNL staff participated on a joint Hanford contractor review team tasked to provide cost analysis reports to the Hanford Site Management Board (SMB). Reports were developed and presented on four of 13 services identified for review during FY2000. The SMB recommended action and/or further study on all four. A fifth presentation was prepared but never presented to the SMB and reviews were completed on seven of the remaining eight services with the conclusion that no action was required from the SMB but rather cost allocation issues would be worked between the contractors.

Based upon the performance indicators that support this objective, our rating for FY2000 is **Outstanding**.

## **Analysis**

DOE's evaluation of overall Contractor performance in the Facility management systems. This indicator demonstrates the overall effectiveness of the Laboratory's Facility management systems in the areas of compliance with applicable contractual requirements; effective and efficient delivery of products, services and systems; and continuous improvement of the ES&H system. PNNL continues to achieve outstanding progress toward full deployment of systems that are compliant with requirements and deliver effective and efficient products and services to support the mission of the Laboratory.

DOE-RL organizations will utilize PNNL's Self-Assessment results as the primary means for this performance evaluation. DOE-RL business management organizations may also utilize one or more of the following, in addition to Self-Assessment, in evaluating PNNL's performance on this indicator:

1. Operational awareness/daily oversight activities
2. For Cause Reviews
3. Other outside agency reviews
4. Annual 2-Week review

The basis for the scoring of this indicator were Memoranda of Understanding (MOUs) that were developed jointly by the DOE-RL point-of-contact and the Laboratory management system owner. Each MOU spelled out how performance of the specific management system was to be evaluated and how the final score was determined. Overall performance for this indicator was determined by averaging the equally weighted scores of the individual management systems. Table 2.3 below, provides the evaluation scores for each of the management systems covered by this indicator. Highlights from selected Facility management system self-evaluations follow.

Table 2.3. Summary of Self-Evaluation Scores for Facility Management Systems

Management System	Score	Management System	Score
Emergency Preparedness	4.6	Facility Operations and Maintenance	5.0
Facility Acquisition and Disposition	4.75	Safeguards and Security	5.0
		Overall Average	4.8

- Emergency Preparedness
  - The EP Program Office received an Independent Oversight Special Study of September 20, 1999. This was reviewed and corrective action incorporated into the PNNL ATS for appropriate disposition. All identified actions have been completed. There were three (3) improvement items identified while at the same time identifying eight (8) positive attributes. There were no deficiencies or weaknesses identified.
  - Exercise "Bold Endeavor" received high marks from DOE-RL. There were seven (7) Noteworthy Practices identified in the final exercise report. The 325 Building Emergency Response Organization received noteworthy recognition by the Evaluation Team regarding (1) effective use of their procedures and checklist, (2) a comprehensive understanding of the Incident Command System was clearly shown, and (3) team work and professional response during the exercise. Only one improvement item was identified for PNNL, there were no deficiencies or weaknesses identified for PNNL.
- PNNL reported a security incident in July 2000 that occurred during the Site wide Hanford Fire emergency. Following consultation with DOE-RL PNNL initiated a security stand-down in response to this incident involving the control and protection of a classified document. The stand-down was initiated to ensure that the Laboratory fully maintains our capability to conduct classified work to the highest standards. A team of senior staff from across the Laboratory was formed to examine the status of the Laboratory's classified work, develop lessons learned, and determine the actions necessary to formalize restart criteria. The multiple actions

taken during the stand-down included reinforcement of the awareness of all staff and management, strengthening the Roles, Responsibilities, Accountabilities, and Authority (R2A2s) associated with classified work, emphasizing the reporting process for such incidents, and sharing lessons learned. The implementation of these actions revealed several additional opportunities for improvement. Completion of the actions will help to assure that classified work activities continue to be conducted in a manner that not only meets all security objectives but also enhances our ability to achieve program objectives.

- Facility Acquisition and Disposition (FAD)
  - 100% of Assigned Record of Decisions (RODs) were completed and incorporated into FAD External Requirements Flow Down Document.
  - Complete Building Life Cycle Plans (BLCP), including Condition Assessments. In FY1999, PNNL assessed and recommended improvements to the BLCP context and format. The following building life cycle plans were completed in FY2000: 305-B, 306W, 318, 320, 323, 325, 331, 337, 338, 747A, 3718A&B, 3730, 3760, EDL, Math, and PSL. These plans constitute 41% (16 of 39) of the plans to be completed. The completed condition assessments covered 65% of all buildings and represent 85% to 90% of the content of the Building Life Cycle Planning document. This effort represents significant progress towards improving the level of maturity for evaluating facilities and their life cycle needs.

**Identification of facilities and infrastructure that is commensurate with the Laboratory's strategy of becoming the enduring national asset at the Hanford site.** The completion and issuance of the FY2000 Facility and Infrastructure Strategic Plan on December 30, 1999, fulfilled this indicator action. This plan reflected a significant improvement over previous plans primarily due to extensive partnering between the Facilities Directorate and all research divisions. The plan improved alignment with facility and infrastructure needs and the strategic direction of research initiatives.

In addition to achieving this objective the following additional accomplishments were achieved in the area of Facility Strategic Planning.

- Substantial support was provided to the development of the Hanford 300 Area Accelerated Closure Plan that was submitted to DOE on June 28, 2000.
- Conceptual Design Reports was updated and submitted in a very short time frame for the DOE-SC approved Mission Need and Validation for two Line item projects that are designated to upgrade core Laboratory Facilities in the 300 Area. If approved, funding totaling \$16.4M would be authorized.
- PNNL finalized negotiations with 3rd party investor to construct User Facilities Housing Facility (UHF). This facility addition represents a significant achievement towards the facility strategy of improving support for scientific collaboration at PNNL user facilities.
- PNNL Hosted a Multi-Program, Laboratory Operating Coordinating Council (LOCC) meeting with other Science Laboratory's on June 7, 8, and 9th to begin developing the requirements for infrastructure improvement initiatives at each laboratory site.
- Planning was initiated to define the science facilities required to accomplish future missions of the PNNL including: Post Genomic R&D, Topical Computing, Terra Scale Computational Research, 300 Area Replacement & Modernization Infrastructure, Sustainable Developmental Laboratory, and Classified Computer Systems.

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**Prioritization and selection of key FY2000 facility initiatives from the Facility and Infrastructure Plan.** Facilities and Infrastructure milestones were identified and provided to DOE-RL on January 31, 2000. The following milestones were selected as indicators for demonstrating the alignment of the Facility Strategic Plan with R&D infrastructure needs. The completion dates follow each item.

- Activate EESB Limited Area Island - Phase 2 (7/31/00)
- 331A Demolition, 331 Chiller Upgrade using 331A Slab (6/30/00)
- Close 3745 (9/15/00)
- Complete OC3 System Upgrade (8/15/00)
- IBX Telephone System Relocation and Upgrade (7/28/00)

**Completion of approved milestones (see above).** The status of the individual milestones identified above follows:

- Activate EESB Limited Area Island - Phase 2 (7/31/00) - PNNL completed the facility modifications according to schedule, however, based on the request and the benefits to be realized, delayed the moves necessary to activate the LAI phase 2. This action was intentionally delayed by PNNL to permit the acquisition of additional office space. Research organizations requested that the original plan and schedule be delayed since the acquisition of additional space would reduce cost and cause less disruption to ongoing activities. These savings were primarily realized by avoiding duplicate moves. Since this delay was to accommodate a request to minimize the potential negative effect on R&D activities the strategic value of consolidating non-lab LAI's will still be realized after the moves are completed and without significant impact to these R&D objectives.
- 331A Demolition and 331 Chiller Upgrade (6/30/00) - This activity was completed as scheduled and significantly contributed strategic value to facility related issues. The restoration and reuse of an existing pad after facility decommissioning achieved three significant outcomes. Cost savings were realized on both projects and the decommissioning of the facility was the first environmental reclamation completed under CERCLA regulations for PNNL. This reclamation is considered precedent setting for dealing with future facility removals of this type on the Hanford site and should significantly reduce projected costs.
- Close 3745 (9/15/00) - This action was completed on August 25, approximately three weeks ahead of the identified date. The closure of this facility will enable transition of the facility for final D&D and reduce PNNL's cost of vacant space beginning in FY2001.
- Complete OC3 System Upgrade (8/15/00) - This milestone has great strategic significance for the research missions of the Laboratory and will be realized early in FY01. The completion of the milestone was delayed due to conflicts between service providers which were second tier subcontractors to PNNL but which PNNL did not have direct control over. During the performance period PNNL met and facilitated issue resolution between the providers and our primary subcontractor to keep this effort on track. Eventually, the service contracts were accomplished and the needed capability was installed on September 20, 1999. Acceptance testing began at that time and technical issues between connection points have extended the delay. At this time, technical resolution is continuing and activation of the system is imminent. The delays encountered have detracted from the overall schedule performance however, the actions initiated by PNNL demonstrated leadership towards achieving the higher strategic value.

- IBX Telephone System Relocation and Upgrade. This project was completed on 7/28/00 as planned. The strategic value of this modification included capacity upgrades, revitalized an aging telecommunication system and with its relocation to more suitable mechanical space will allow for increasing the capacity of the Physical Sciences Laboratory facility.

**Influence with the Site Finance Board sub-team regarding site infrastructure services.**

PNNL staff participated on a joint Hanford contractor review team that presented cost analysis reports to the Site Management Board (SMB) on four (4) of 13 services identified for review during FY2000. The SMB recommended action and/or further study on all four. A fifth presentation was prepared but never presented to the SMB. Reviews were completed on 7 of the remaining 8 services with a conclusion that no action was required from the SMB but rather cost allocation issues would be worked between the contractors. Agreement by the site contractors that no action by the Site Management Board was necessary, was considered to be equivalent to making the presentation to the SMB. The remaining service (Desktop Services) was not easily identifiable as a single service, thus no action was taken. A list of the services reviewed and comments follows.

- Dosimetry – While costs are perceived to be high, the current allocation methodology is sound. PNNL management will work with DOE-RL on cost reduction opportunities
- Transportation/Stores – A proposal to reduce costs by roughly \$1M was presented
- Analytical Labs – The SMB tasked DOE-RL's Infrastructure Division to review options for reducing per unit analytical costs
- Fleet Services – Improved customer communication processes eliminated many perceived issues
- Occupational Medicine – Hanford legacy costs will be funded on the EM program base. This action is delayed until FY2002
- Hanford Reach – The publishers subcontract will be competed for potential cost reduction and the contractor cost allocation will be renegotiated
- Records Management – The cost allocation methodology was analyzed and agreed-to.
- Waste Generators – Generators will be allowed to obtain services based on individual need rather than from a central provider
- Emergency Preparedness – The review was completed with no significant findings to report
- Media Services – The review was completed with no significant findings to report
- Locksmith – The review was completed with no significant findings to report
- Desktop Services – A specific service was not identifiable. No review was conducted
- Fire Department – A recent cost allocation study was reviewed, services and the facility were observed. The review committee's report agreed with prior recommendations.

The overall performance rating for the Operational Excellence Critical Outcome is determined by comparing the total determined value in Table 2.4, to the rating scale in Table 2.5.

**Table 2.4. Operational Excellence Critical Outcome Performance Rating Development**

Element	Adjectival Rating	Value Points	Indicator Weight	Total Points	Objective Weight	Total Points
<b>2.1 Operational Excellence</b>						
<b>2.1 Sustain and enhance operational excellence in safety and health, and environmental protection.</b>						
2.1.1 DOE's evaluation of the overall Contractor performance in the Environmental, Safety, and Health (ES&H) management systems	Outstanding	5.0	60%	3.0		
2.1.2 Demonstrate effectiveness of Integrated Safety Management	Outstanding	5.0	40%	2.0		
<b>Obj 2.1 Total</b>				<b>5.0</b>	<b>50%</b>	<b>2.5</b>
<b>2.2 Deliver, operate, and maintain an optimum set of facilities and supporting infrastructure that are aligned with current and future mission needs</b>						
2.2.1 DOE's evaluation of the overall Contractor performance in the Facility management system	Outstanding	5.0	50%	2.5		
2.2.2 Identification of facilities and infrastructure that is commensurate with the Laboratory's strategy of becoming the enduring national asset at the Hanford Site	Outstanding	5.0	20%	1.0		
2.2.3 Priorization and selection of key FY00 facility initiatives from the Facility and Infrastructure Plan	Outstanding	5.0	10%	0.5		
2.2.4 Completion of approved milestones identified in 2.2.3	Outstanding	5.0	10%	0.5		
2.2.5 Influence with the Site Finance Board sub-team regarding site infrastructure services	Excellent	4.0	10%	0.4		
<b>Obj 2.2 Total</b>				<b>4.9</b>	<b>50%</b>	<b>2.4</b>
<b>Outcome Total</b>						<b>4.9</b>

**Table 2.5. Operational Excellence Critical Outcome Final Rating**

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	<1.5
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory



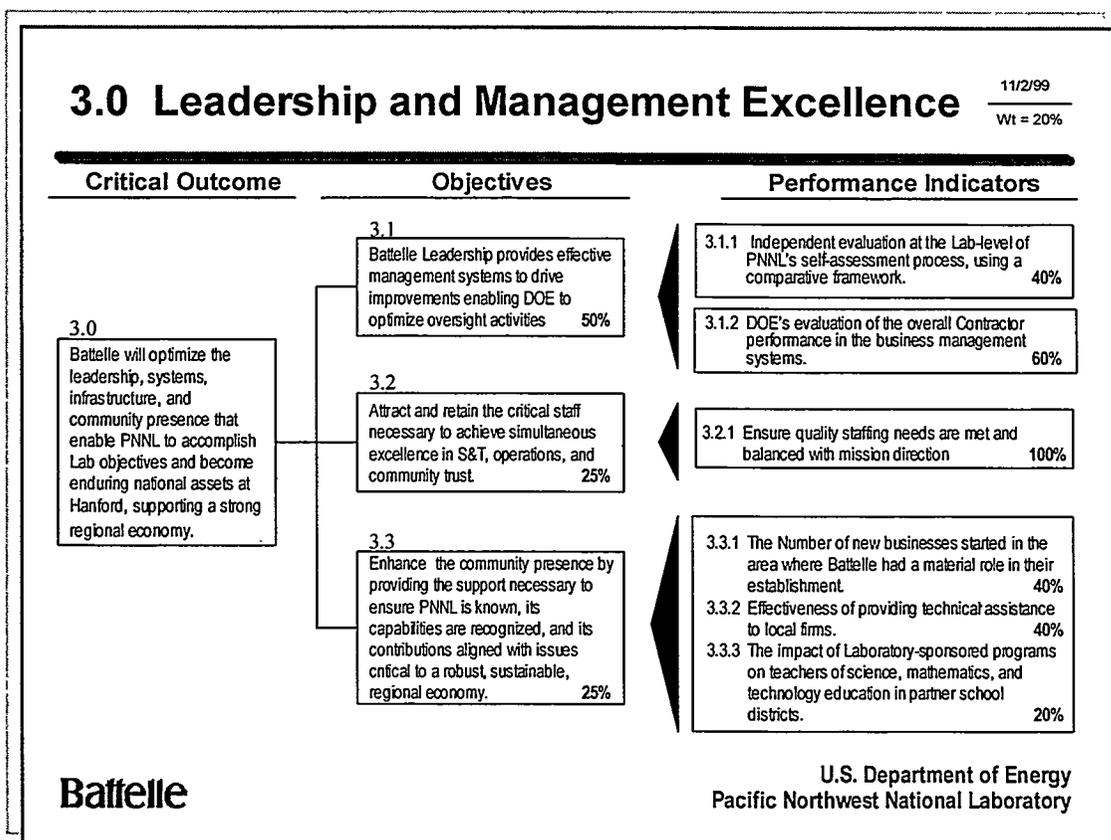
### 3.0 Leadership and Management Excellence

The Department of Energy's Strategic Plan establishes four primary critical success factors. Two of these critical success factors are Communication and Trust, and Human Resources. We recognize that the heart of the Laboratory is made up, not of facilities and equipment, but of our research and support staff. Managing the Laboratory in the complex world of today requires effective and involved leaders. We recognize that effective leadership and management are critical to our success, both at the personal level and at the institutional level.

Additionally, leaders, managers and staff cannot deliver high quality products and services without the support of world-class management systems. We have developed the set of management systems critical to the expert delivery of our products and services. We use our assessment process to provide management with accurate technical, business and operational performance information that promotes early identification and resolution of problems that may impact achievement of the Laboratory's Critical Outcomes.

The DOE has made a strong commitment to help local economies transition to a post-cleanup world in which thousands of DOE-supported jobs will disappear and must be replaced by private-sector activities.

Just as the PNNL's business mission underlines its role of advancing technology in the Northwest Region, so too does PNNL's commitment to the local communities drive its efforts to serve the



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neighborhoods in which the staff live and work, the local multi-county region and the Laboratory through economic development, open communication and science, mathematics and technology education reform.

For these reasons and in partnership with DOE, the Laboratory established the following Critical Outcome, objectives, and performance indicators to guide our efforts and monitor our progress.

The Leadership and Management Excellence Critical Outcome Tree, detailing the Critical Outcome and its' supporting Objectives and Performance Indicators, is presented on previous page.

## Summary

Battelle leaders and managers are making a difference within the DOE Complex, Pacific Northwest National Laboratory and the community. We are developing world-class leaders, infrastructure and management systems to help drive our strategic goal of becoming the Benchmark Standard for Laboratory management. At the same time, our significantly positive efforts to stimulate the regional economy are bearing fruit.

The Information and Analysis portion of our self-assessment program was evaluated by an independent subject matter expert and was judged to be what a typical Baldrige Award winner would score in the area of Measurement of Organizational Performance (60%). As expected however, the program was rated as being in the beginning stages of Analysis of Organizational Performance (20%). The identification of a number of areas for improvement will allow us to focus efforts for significant improvement in FY2001.

The Laboratory continues to maintain a strong cadre of scientific, engineering and management leaders. As a result of our strong Succession Planning program, thirty-two (32) key and strategic positions were filled by a combination of succession planning (50%) and external hiring (50%). Our vigilance at developing and bringing in key staff has eliminated concerns about a possible 'brain-drain' as Battelle placed qualified leaders, managers and scientists at other Battelle-affiliated national laboratories.

We are helping create a diversified economy by putting technology to work in the Tri-Cities region. In FY2000 we launched, or helped launch, 10 new businesses and we provided technical assistance to 55 additional businesses, in a year where programmatic funds dried up and additional sources needed to be identified. Ninety-one percent (91%) of the technical assistance recipients surveyed indicated that they were satisfied or better with the utility of the assistance provided and with the interaction process, providing solid feedback that our technical assistance program is delivering what the customer needs.

The Laboratory continues to be an extremely strong influence concerning the enhancement of science and mathematics education. Eighty-four (84) teachers participated in four Laboratory-sponsored projects for teachers of science, mathematics, and technology in FY2000. Of those who completed and returned evaluations, 86.8% (66 teachers) rated the programs at sums of 10 or higher.

Based upon our progress toward the Objectives that support this Critical Outcome, we believe our FY2000 performance rating is **Outstanding**.

### **3.1 Battelle Leadership Provides Effective Management Systems to Drive Improvements Enabling DOE to Optimize Oversight Activities**

#### **Results**

The Laboratory is making significant progress toward optimizing its management systems for effective and efficient delivery of products and services. Our self-assessment program, the cornerstone of our continuous improvement efforts, continues to mature and is regarded as one of the best in the DOE Complex.

The Information and Analysis portion of our self-assessment program was evaluated by an independent subject matter expert and was judged to be what a typical Baldrige Award winner would score in the area of Measurement of Organizational Performance (60%). As expected however, the program was rated as being in the beginning stages of Analysis of Organizational Performance (20%). A number of strengths were recognized by the independent expert including the comprehensive nature of the program and the clear linkage of customer requirements, strategic planning, and performance measurements. Several areas for improvement were also identified. Overall, the evaluator felt that Battelle's performance measurement system was the most comprehensive and mature in comparison to all other national laboratories he had reviewed.

During FY1998 and FY1999, we developed and documented our management systems. During FY2000 we sought to optimize each of the business management systems. Performance results based on Memoranda of Understanding between DOE-RL and the management system owners indicate that eight of the 12 management systems scored in the Outstanding range while the remaining four scored in the Excellent range. Also noteworthy this year was the integration of the self-assessment and planning processes.

Based upon the performance indicators that support this objective, we believe our rating for FY2000 is **Outstanding**.

#### **Analysis**

**Independent evaluation at the Laboratory-level of PNNL's self-assessment process using a comparative framework.** During FY2000 the Laboratory performed a two-phase evaluation of the Laboratory's performance measurement system. First, a team of Level 2 managers representing a cross-section of the Laboratory's organizations, and a Senior DOE Excellence Award Examiner, performed a self-evaluation at the Laboratory level, based on the Malcolm Baldrige Criteria for Performance Excellence. This evaluation focused on Category 4.0 of the Criteria, Information and Analysis, which is representative of an organization's performance measurement system. Second, in accordance with the Indicator, and a Memorandum of Understanding with DOE-RL, a nationally recognized expert in application of the Malcolm Baldrige Criteria was hired to perform an independent evaluation of the Laboratory's performance measurement system, using the self-evaluation report and on-site interviews with key Laboratory staff as the basis for the evaluation. Based on the results of the independent evaluation, the Laboratory's performance measurement system approached what a typical Baldrige Award winner would score in the area of Measurement of Organizational Performance (60%), but was rated as being in the beginning stages of Analysis of Organizational Performance (20%). The Laboratory achieved an overall score of 39 points for a rating of Good.

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In addition to providing a rating, the evaluator also identified a number of Strengths and Areas for Improvement within the Laboratory's performance measurement system. A summary of the identified Strengths and Areas for Improvement follows.

### **Summary of Strengths of PNNL's Performance Measurement System (Assessment Processes)**

Based on the independent evaluator's final report, the following strengths in performance measurement and analysis were identified:

- The Integrated Assessment system provides a comprehensive look at overall organizational performance, as well as connection of division, directorate, and group-level assessments through the self-assessment component of the process.
- There is clear linkage of customer requirements, strategic planning, and performance measurement.
- The Peer Review process seems to be a "best practice" method of assessing the quality of Laboratory mission performance.
- Performance reviews occur regularly at all levels of the organization.
- Some data are regularly trended over time to assist in organizational understanding of changing levels of performance.
- Some groups are using tools such as performance dashboards, aggregated performance measures, and trend data to understand group-level performance

### **Summary of Areas for Improvement in PNNL's Performance Measurement System**

- Some Critical Outcomes have associated performance indicators that are not measurement, data, or information oriented.
- There does not seem to be a method to objectively measure customer satisfaction throughout the year, or to predict the level of satisfaction.
- While much data are gathered, there does not seem to be a comprehensive plan that guides data collection efforts throughout the Laboratory.
- While there is clear evidence of regular analysis of performance data and information occurring in various parts of the organization, understanding of Laboratory-level performance does not seem to benefit from the same level of rigor.
- Many data do not seem to be tracked and trended over time.

In addition to evaluating Battelle's performance measurement system, the independent evaluator also provided a brief comparison with two other national laboratories and two Testing and Evaluation organizations. Overall, the evaluator felt that PNNL's performance measurement system was the most comprehensive and mature in comparison to all the other organizations.

**DOE's evaluation of the overall Contractor performance in the business management systems.** This indicator provides a measure of the overall effectiveness/performance of the business management systems at delivering products and services and complying with applicable requirements.

The DOE-RL business management organizations will utilize Battelle's Self-Assessment results as the primary means for this performance evaluation. DOE-RL business management organiza-

tions may also utilize on or more of the following, in addition to Self-Assessment, in evaluating Battelle's performance on this indicator:

1. Operational awareness/daily oversight activities
2. For Cause Reviews
3. Other outside agency reviews
4. Annual 2-Week review

The basis for the scoring of this indicator were Memoranda of Understanding (MOUs) that were developed jointly by the DOE-RL point-of-contact and the Laboratory management system owner. Each MOU spelled out how performance of the specific management system was to be evaluated and how the final score was determined. Overall performance for this indicator was determined by averaging the equally weighted scores of the individual management systems. Table 3.1 below, provides the evaluation scores for each of the management systems covered by this indicator.

Table 3.1. Summary of Scores of the the 12 Business Management Systems

Management System	Score	Management System	Score
Acquisition Management	4.0	Integrated Planning	5.0
External Interface	4.6	Internal Communications	5.0
Financial Management	4.5	Records	4.0
Human Resources	5.0	Scientific and Technical Communications	5.0
Information Resources	4.0	Technology Commercialization	5.0
Integrated Assessment	5.0	University & Science Education	5.0
		<b>Overall Average</b>	<b>4.7</b>

Nine of the 12 management systems scored in the Outstanding range while the remaining four scored in the Excellent range. With all 12 management systems weighted equally, the final averaged rating for FY2000 was 4.7. Scoring was based upon a scheme where an Outstanding received a 5.0, Excellent received a 4.0, Good was a 3.0, Marginal was a 2.0 and Unsatisfactory was a 1.0.

Highlights from selected Business management system self-evaluation follow.

- Acquisition Management
  - Customer satisfaction for FY2000 was 98.1%, the highest ever.
  - Our cost to spend ratio was 0.028, the lowest ever.
- Integrated Assessment and Integrated Planning
  - The annual self-assessment planning portion of the Integrated Assessment management system was shifted six months from year-end, to mid-year, to allow for integration with the business planning process. This shift allows organizations to plan their business for the following year and to determine how they will measure their success at the same time. This integration required a significant amount of effort but is being recognized by both PNNL and DOE-RL staff as having high value and impact to both, the business planning, and the self-assessment processes.

- Scientific and Technical Information
  - Implemented ERICA, Phase 2. The full text of 68% of newly published reports is available on the web.
  - STI staff were presented a Hammer Award by Vice President Gore to the STIP community “for building a government that works better and costs less.”
- Technology Commercialization
  - 265 invention reports were filed in FY2000 compared to our target of 156
  - 57 patent applications were filed and 32 U.S. patents were awarded.

Based on evaluation of the criteria of each management system MOU, we believe our performance against this indicator to be Outstanding.

### **3.2 Attract and Retain the Critical Staff Necessary to Achieve Simultaneous Excellence in S&T, Operations and Community Trust**

#### **Results**

In support of our strategic goal to become a world class Laboratory, Battelle recognizes the need to develop leaders, managers, scientists and engineers that can take their place alongside the best in the world. We made outstanding progress toward filling identified key and strategic hiring needs during FY2000. Thirty-two key and strategic positions were filled by a combination of succession planning and external hiring, thus eliminating concerns about a possible ‘brain-drain’ as Battelle placed qualified leaders, managers and scientists at other Battelle-affiliated national laboratories.

Based upon the performance indicator that supports this objective, our rating for FY2000 is **Outstanding**.

#### **Analysis**

Ensure quality staffing needs are met and balanced with mission direction. We made outstanding progress toward filing our strategic staffing needs in FY2000. We enhanced our workforce planning process related to strategic/key positions and placements. The Staffing Programs Department provided monthly updates of the strategic workforce planning document to the Level 1 Associate Laboratory Directors (ALD) for use in their monthly meetings with their respective DOE AMT Division Director. Additionally, each quarter, the PNNL Strategy Council discussed progress towards meeting the strategic staffing needs of the lab.

Statistics from the strategic placements for FY2000 resulted in 32 strategic/key positions being filled, including:

- 16 positions filled by succession planning
- 16 positions filled through external hires
- 12.5% of the positions were filled by minorities
- 18.7% of the positions were filled by women
- Education distribution included 21 PhDs, 8 MS degrees, and 3 BS degrees

- Strategic positions included
  - Four (4) Level 1 Managers
  - Eighteen (18) other Management positions (including Product Line Managers, Sub-sector Managers, Program Managers)
  - One (1) S&E 4 position
  - Seven (7) S&E 5 positions
  - Two (2) S&E 6 positions

Each ALD/AMT team regularly discussed capability requirements necessary to meet strategic Laboratory initiatives, progress towards meeting strategic staffing objectives, and identified potential barriers to placement. We believe the responsible DOE AMT Division Director will assign an “outstanding” rating for this objective.

### 3.3 Enhance Community Presence by Providing the Support Necessary to Ensure PNNL is Known, its Capabilities are Recognized, and its Contributions Aligned with Issues Critical to a Robust, Sustainable, Regional Economy.

#### Results

We have had an outstanding year of putting technology to work in the Tri-Cities region in FY2000. We helped launch or expand, 10 new businesses in a year where we started the year with concerns about a lack of program funds. In addition, PNNL staff initiated 55 technical assistances in a year where 3161 funding dried up and program staff were forced to secure new sources of funding in order to keep the technical assistance program going. In spite of funding concerns, 91% of the technical assistance recipients surveyed indicated that they were satisfied or better with the utility of the assistance provided and with the interaction process. Finally, 84 teachers of science, mathematics, and technology from partner school districts participated in summer research projects. Seventy-six 76 of the teachers turned in evaluations (a 90% return rate). Of those who completed and returned evaluations, 86.8% rated the programs at sums of 10 or higher on a 12-point scale.

Based upon the performance indicators that support this objective, our rating for FY2000 is **Outstanding**.

#### Analysis

The number of new businesses started in the area where Battelle had a material role in their establishment: Battelle had a material role in the establishment of ten (10) new businesses in FY2000 see Figure 3.1. That we achieved 10 new business or expansions in FY2000 is a function of a variety of factors.

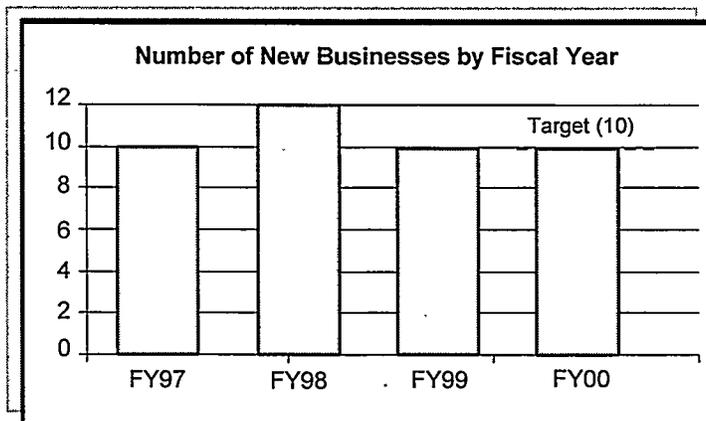


Figure 3.1. Annual New Business Starts or Expansions

## **PNNL-Assisted New Business Starts for FY2000**

1. **OmniViz** – is a wholly-owned subsidiary of Battelle that was formed to commercialize biotechnology applications of Battelle's information visualization software. Battelle has invested more than \$5 million in OmniViz to date. OmniViz has several paying customers.
2. **UNIBEST International** – is commercializing an innovative soil testing and environmental monitoring technology – ion exchange resin capsules. PNNL's ABCD helped develop data analysis software and hardware, and helped obtain a grant from the Washington Technology Center. PNNL also helped UNIBEST get in front of the Alliance of Angels, a technology-based investor group.
3. **DUWL, Inc.** – Manufactures an innovative test kit for dentists to assess the quality of water used in dental procedures. PNNL helped with irradiation of the test kits to assure accurate test results and long shelf life. PNNL is also providing technical assistance to develop a new product line at DUWL.
4. **RTS Enabling Technology** – A vendor of leading-edge software to commercial and government customers. PNNL helped RTS-ET grow from four employees to 55 over the last several years by providing technical assistance in several areas, including licensing chemical management software to RTS-ET, and collaborating on important contracts.
5. **Control Tech** – A manufacturer of bicycle and aerospace components, Control Tech was acquired and relocated to the Tri-Cities as the direct result of PNNL's network of consultants making the appropriate connections.
6. **Image Works Digital Media** – Developer of interactive CD-ROM, Internet-based media, and digital video products. PNNL helped Image Works Digital Media by training its staff on advanced development software and by contracting for high-end multimedia products, thereby expanding the firm's product offerings.
7. **Booth in a Box** – Invented and manufactures portable, integrated tradeshow furnishings. The product recently won the Buyers Choice Award for Best New Product at the National Exhibitor Show.
8. **Pair Tree** (formerly Amazing Space) – Invented and is manufacturing a rotating shoe storage system. PNNL provided design and analysis assistance.
9. **Plastic Injection Molding** – A three-year-old firm that does custom injection molding of many products. PIM is the plastics vendor to several other firms that PNNL helped start.
10. **Virion** – PNNL helped start Virion four years ago to make anti-viral medication. Virion has recently added several non-allergenic skin care products to its line. PNNL provided technical assistance to help set up Virion's new microbiology laboratory, which is located along with Virion's production facilities in the Applied Process Engineering Laboratory (APEL).

The first of these was the result of sustained, multi-year efforts to attract and launch specific businesses. A number of the new business starts or expansions in FY2000, for example, RTS Enabling Technology, began as technical assistance projects several years ago. Another business, Control Tech, was started locally as a result of Battelle consultants seeking to attract new businesses from along the I-5 corridor on the west side of the state. Still other businesses came to us first.

**Effectiveness of providing technical assistance to local firms:** Throughout FY2000 PNNL staff initiated 55 technical assistances to requesting firms. This is astounding in a year where 3161 funding dried up and program staff were forced to secure two (2) new sources of funding in order to keep the program going. Further, a full 91% of the technical assistance recipients surveyed indicated that they were satisfied or better with the utility of the assistance provided and with the interaction process, surpassing our FY2000 target of 90%. In addition, 8 of the 10 start-up firms discussed above (80%) received technical assistance exceeding our target of 75%.

**Impact of Laboratory-sponsored programs on teachers of science, mathematics and technology education in partner school districts:** Four Laboratory-sponsored projects for teachers of science, mathematics, and technology were conducted in FY2000. A total of 84 teachers participated in the four projects. Seventy-six (76) teachers turned in evaluations (90% return rate). Of those who completed and returned evaluations, 86.8% (66 teachers) rated the programs at sums of 10 or higher.

1. Partnership for Arid Lands Stewardship (PALS) Teacher Project
  - 1999-00 Academic Year PALS Teacher Project - 20 of 26 evaluations were received with 18 (90%) having a sum of 10 or higher.
  - 1999 Summer PALS Teacher Project - 23 of 25 evaluations were received with 23 (100%) having a sum of 10 or higher.
2. Pre-Service Teacher (PST) Project
  - 2000 Summer Pre-Service Teacher (PST) Project - 4 of 4 evaluations were received with 3 of the 4 evaluations (75%) having a sum of 10 or higher, and 100% having a sum of 9 or higher.
3. Scientist-Student-Teacher (SST) High School Research Project
  - 2000 Summer SST Project - 14 of 14 evaluations were received with 12 of the 14 evaluations (86%) having a sum of 10 or higher.
4. Teacher Research Participation (TRP) Project
  - 2000 Summer TRP Project - 15 of 15 evaluations were received with 10 of the 15 evaluations (66%) having a sum of 10 or higher and 13 of 15 evaluations (87%) having a sum of 9 or higher.

A common set of statements were used in the PALS, PST, Scientist-Student-Teacher (SST), and Teacher Research Participation (TRP) projects to measure impacts on teacher content knowledge, skills, and ability to transfer learning to the classroom. Teachers rated each statement using a 1 (low) to 4 (high) scale to indicate their agreement with the statement. In addition to these common sets of statements, project managers asked additional questions on their assessment surveys, which were designed to gather more information that could be used for program improvement.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY2000 is **Outstanding**.

Table 3.1. Leadership and Management Excellence Critical Outcome Performance Rating Development

Element	Adjectival Rating	Value Points	Indicator Weight	Total Points	Objective Weight	Total Points
<b>3.0 Leadership and Management</b>						
<b>3.1 Battelle Leadership provides effective management systems to drive improvements enabling DOE to optimize oversight activities.</b>						
3.1.1 Independent evaluation at the Laboratory-level of PNNL's self-assessment process using a comparative framework	Good	3.0	40%	1.2		
3.1.2 DOE's evaluation of the overall Contractor performance in the business management systems	Outstanding	5.0	60%	3.0		
Obj 3.1 Total				4.2	50%	2.1
<b>3.2 Attract and retain the critical staff necessary to achieve simultaneous excellence in S&amp;T, operations, and community trust</b>						
3.2.1 Ensure quality staffing needs are met and balanced with mission direction	Outstanding	5.0	100%	5.0		
Obj 3.2 Total				5.0	25%	1.25
<b>3.3 Enhance the community presence by providing the support necessary to ensure PNNL is known, its capabilities recognized, and its contributions aligned with issues critical to a robust, sustainable, regional economy</b>						
3.3.1 The Number of new businesses started in the area where Battelle had a material role in their establishment	Outstanding	5.0	40%	2.0		
3.3.2 Effectiveness in providing technical assistance to local firms	Outstanding	5.0	40%	2.0		
3.3.3 The impact of Laboratory-sponsored programs on teachers of science, mathematics, and technology education in partner school districts	Outstanding	5.0	20%	1.0		
Obj 3.3 Total				5.0	25%	1.25
					Outcome Total	4.6

Table 3.2. Leadership and Management Excellence Critical Outcome Final Rating

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	<1.5
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

## 4.0 Determining the Laboratory's FY2000 Performance Rating

Battelle's performance rating for FY2000 is developed by determining the year-end level of performance for each performance indicator, compared to the individual targets established in the FY2000 Performance Evaluation & Fee Agreement, Modification No. 321. This level of performance is then judged against the metrics developed for each performance indicator and an appropriate adjectival rating is assigned. The adjectival rating for each performance indicator is inserted into the Rating Table found at the end of each Critical Outcome section and Value Points are assigned, based on the following scale: Outstanding performance = 5 points; Excellent performance = 4 points; Good performance = 3 points; Marginal performance = 2 points; and Unsatisfactory performance = 1 point.

The Value Points are added to the Tables and are multiplied by the weight of each performance indicator and added to develop the Objective score. The Objective scores are then multiplied by the Objective weightings and are added to develop the overall score for the Critical Outcome. The values from the individual Critical Outcome tables are then transferred to Table 4.1 below, and summed to develop the Laboratory's overall performance rating for FY2000.

The individual (weighted) Critical Outcome scores are added to determine the overall Laboratory score. This value is compared against the ranges found in Table 4.2 below to determine the Laboratory's overall FY2000 (adjectival) performance rating.

Table 4.1. FY2000 Contractor Evaluation Sheet Calculation

Critical Outcome	Value Points	Adjectival Rating	Weight	Weighted Score	Weighted Score
Science & Technological Excellence	4.8	Outstanding	60%	2.9	
Operational Excellence	4.9	Outstanding	20%	1.0	
Leadership & Management Excellence	4.6	Outstanding	20%	0.9	
				Overall Lab. Total	4.8

Table 4.2. Scientific and Technological Excellence Critical Outcome Final Rating

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	<1.5
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory



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## **Part II**

### **Summary of Laboratory Strengths and Areas for Improvement for FY 2000**

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## Overview

In 1995, the PNNL embarked upon a systematic management process intended to continuously improve performance in science and technology as well as our operational processes and systems, while ensuring the safety and health of the environment, the public and our staff. This process is called Integrated Assessment and is embodied in the Integrated Assessment (IA) Management System. The objectives of the IA Management System include:

- Providing the Laboratory and Department of Energy (DOE) staff and line management accurate technical, business and operational performance information that promotes early identification and resolution of problems that may impact achievement of the Laboratory critical outcomes, division/product line objectives, and directorate/management system objectives.
- Verifying conformance to established requirements.
- Verifying effective conduct of activities (expected by DOE and the Laboratory senior management) to protect the environment and the health and safety of workers and the public.
- Identifying attributes that lead to superior performance and shared learnings.
- Driving ongoing improvements to performance.

PNNL has long recognized that the assessment process would be an evolutionary one; maturity would be gained as incremental lessons were learned. PNNL also recognized that occasional revolutionary changes were possible but that they should be allowed to happen as naturally as possible. The development and implementation of Integrated Assessment was revolutionary; the sustained progress we have made has been primarily evolutionary. A key facet of our past and future success is our ability to make the right changes at the right time. A notable feature of our continued maturation involves our assessment of key strengths as well as areas for improvement. The ability to accurately pinpoint key strengths and areas for improvement is a sign of a healthy and maturing organization that is capable of continuously improving and renewing itself.

In FY1999 it became apparent that we had no systematic mechanism to identify Lab-level issues or areas for improvement. Our response to this issue was to gather a team of key level 2 managers across the Laboratory to help distill a set of diverse issues into a core set that 1) was important to the Lab overall, 2) to which all organizations were clearly willing to commit resources, and 3) from which we expected enhanced performance, efficiency and/or cost savings. The information was taken from the following sources:

- External oversight results
- Division/Directorate identified opportunities for improvement from their self-assessment activities
- A summarization of the IA management system activities encompassing self-assessment evaluations, independent oversight activities, internal audit activities, and formal peer review results
- Critical Outcome results

Results were presented in Part II of our FY1999 year-end self-evaluation report to DOE.

In FY2000 the process underwent further evolution. Issues identified in Part II and elsewhere throughout both Battelle's year-end self-evaluation and DOE's year-end feedback report were summarized in a matrix in which points of contact, or "owners", were specifically identified for most areas. Each owner identified actions for their applicable area(s) of interest. Finally, we also

attempted to summarize those areas that we believe represent key Laboratory strengths. Key strengths are presented in Section 1, key areas for improvement are presented in Section 2.

The following discussion provides a summary of the actions taken on those key areas of improvement identified from the FY1999 results. New or emerging issues that the Laboratory must focus on to ensure its continued outstanding performance based upon FY2000 results are also presented.

## 1. Key Laboratory Strengths

PNNL intends to be among the world's premier research laboratories, distinguished by scientific excellence and known for solving DOE's most critical and challenging problems, widely recognized for operational excellence, and highly valued by the community and region in which we operate. In evaluating what we believe to be our key strengths it is clear that they support all dimensions embodied in our vision (i.e., premier environmental science and technology laboratory, benchmark standard for laboratory management, and valued community and regional asset). That fact is illustrated in the following discussion.

**Strategic Planning:** The Laboratory Review Committee (LRC) members indicated that PNNL has from their experience by far the best strategic planning process of all the national laboratories. The Division Review Committee (DRC) reports discuss the quality and relevancy of our Science and Technology and highlight areas where we are either well positioned to capture new market opportunities or are already beginning to do so (e.g., PNNL named member of DOE/OBER Joint Genome Institute, acquisition of the Proteomics program exploiting EMSL's unique combination of mass spectrometry technologies, and acquisition of a major program in structural genomics).

A review performed by external subject matter expert, Ken Mandley, also highlighted the integrated and comprehensive nature of the performance measurement system and how it was clearly linked to strategic planning. We can directly observe increased links to our strategy within the business plans, and we can observe progress in articulating our Laboratory Agenda. Finally, our investments are tied to our strategy through the business planning process. A review of Operational Improvement Initiatives (OII), LDRD and IR&D over the past three years shows links to areas we are working to strengthen. Our strategic planning, which is supported by our Integrated Planning and Assessment process, helps us to maintain focus and balance with respect to our R&D, operational leadership and management, and our community and regional interests. We will continue to strengthen this process by enhancing how we communicate our strategy across the Laboratory and to our DOE-RL partners, by continually improving the quality and useability of our planning tools, and by strengthening our analysis capabilities.

**Peer Review:** The DRCs and LRC consistently identify that the Laboratory is responsive to the issues noted by the peer review panels. They also indicate that they were able to see evidence that staff value and utilize the feedback. Finally, if one reviews this year's, as well as previous reports, it can be seen that the process itself is continually improving based upon lessons learned each year. Those lessons learned come to us from the DRC members, Division staff, and DOE-RL. The results of these reviews help us understand all dimensions of our performance.

**Staff:** Our peer review results consistently rate the quality and relevancy of our Science and Technology as Excellent to Outstanding. The foundation of these ratings is our staff. The contributions our staff are making in science and technology important to the nation is highlighted

throughout the peer reviews. Additionally, a key conclusion from Independent Oversight's (I/O) analysis of internal and external oversight activities indicates "Leading indicators of performance, such as attitudes about conducting self-assessment, using corrective action management tools, value of Price Anderson Amendments Act compliance activities to the Laboratory, and customer orientation, support a conclusion that performance improvement will continue." We also see direct evidence of the role our staff play in the Laboratory's success through the recognition they receive in the community, the region, and the nation. The recognition we receive is not limited to our researchers. We are also recognized in areas such as ES&H, communications, and community service. Finally, the staff across this Laboratory are highly visible throughout the community and region, in support of education, outreach and charitable assistance.

**Customer Focus:** Review of division and directorate business plans consistently identifies customer satisfaction as a strength. Not only is this an identified strength across the Laboratory but it also continues to be emphasized in FY2001 as shown by the performance objectives and indicators found in the business plans. Evidence of growth in the rate of funded programs and accepted proposals further supports this view. Finally, direct feedback from our customers supports this view.

## **2. Key Areas for Improvement**

### **2.1 Areas for Improvement Identified in FY1999**

Four key areas for improvement were specifically identified in Part II of PNNL's FY1999 year-end report. These areas for improvement are presented along with progress to date and current disposition. Areas that we believe still need Leadership Team attention will continue to be addressed in future year-end reports as applicable. Those areas where we believe we have made solid progress, and that we believe have been sufficiently institutionalized will be tracked within the appropriate organizational self-assessment program(s).

#### **2.1.1 Systems Approach to Resource Management**

Resources include facilities, space, the infrastructure, equipment and staff. All planning and management decisions should be made treating all components as part of an overall resource system. For example, buildings and the computing infrastructure are both components of our resource base. Decisions on the financial support to these components were generally made on an individual basis. The lack of a systems approach can lead to sub-optimization.

**Progress in FY2000:** In FY2000 5-year strategic plans for both Facility and Operations and Information Technology were developed and submitted. Strategic planning in these critical areas has undergone significant maturation with both plans reflecting 5 year objectives and encompassing a truly systems view of Laboratory needs. Additionally, enhancements made to the planning process continue to strengthen the Laboratory's ability to collect, analyze and make system-based decisions that take all factors (i.e., facilities, space, infrastructure, equipment and staff) into consideration across the Laboratory. Two activities that directly support strengthening our approach to resource management are "Drawing the Roadmap to Second Generation Management Systems" and "21<sup>st</sup> Century Facility Design Concepts". Both of these activities have received OII funding in FY2001. We also have an OII-funded Management Information Systems Breakthrough Team established in FY2001. Furthermore the Lab, in conjunction with DOE-RL, recognizes the importance of this issue and realizes that our resource management needs will not be met overnight.

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As a result we have established Critical Outcome Objective 2.2 in FY2001 which is entitled, "Optimize capability alignment with current and future mission needs".

**Status:** Emphasis in this area will continue in FY2001. Progress will be tracked against the two supporting OIIs as well as in Critical Outcome Objective 2.2.

### **2.1.2 Staff Development, Recruitment, and Retention**

Key issues in this area included; offering the maximum flexibility in pursuing career paths within BMI; ensuring that staff have realistic and challenging career development plans and that succession plans be maintained; ensuring that the strategic staffing needs are projected and are a consideration in hiring decisions; more lateral assignments and reinstatement of the rotation program for entry level S&Es should be considered; and, follow-up of Quality of Worklife (QWL) survey issues, as well as other methods to measure staff interests and satisfaction should be explored. These issues should address the overall lab considerations not just a specific business area.

**Progress in FY2000:** Several key actions were taken in FY2000 to address the issues noted above. A list of key and strategic hires was developed and is being tracked at the Laboratory-level. Progress is reflected under Critical Outcome indicator 3.2.1 and indicates that we are making significant strides in filling our key and strategic staffing needs. We have developed key leadership competencies to help guide our succession planning. The succession planning process, with associated tools to support it, was developed and implemented in FY2000. The Management Skills Development Program has continued to undergo enhancement and directly supports our career development and succession planning needs. The Scientist and Engineer Rotational Program was also redesigned. This program focuses on hiring women and minorities who have recently received a bachelors degree in a technical field. Two hires were made in FY2000.

**Status:** This area will no longer be tracked as a key area for improvement in this report. The HR Management System will continue to monitor progress within their Self-Assessment program in FY2001 working in conjunction with their DOE-RL counterpart.

### **2.1.3 Standard Based Management System (SBMS)**

It is Laboratory management's and the DOE's expectation that the Laboratory will operate in full compliance with requirements. SBMS is the tool that the Laboratory uses to communicate requirements. SBMS has grown since it was first implemented and changes have occurred in many of the subject areas. A systems approach to SBMS and the management systems requirements delivered through SBMS is needed. The SBMS system is not user friendly (i.e., difficult to navigate through all the information an individual needs to know). Integrated Operations, IOPS, was developed in part as a tool to enable implementation of SBMS by the scientist/engineer at the benchtop. Consideration should be given to the needs of others (e.g., TGMs, PLMs,) and additional portals or navigation tools developed where needed.

Although probably most of the requirements in SBMS are externally generated the specific procedures supporting those requirements are not. There needs to be a continuing review by all management systems, including soliciting input from those who have to implement the procedures and comply with the requirements, to continually enhance value (benefit to cost). Proposed changes to SBMS should undergo life cycle cost analysis (considering mortgages and costs to others) prior to implementation.

**Progress in FY2000:** The Laboratory has made considerable progress in addressing the SBMS-related issues identified in FY1999. The process for developing and modifying subject areas was revised and now requires a Notice of Intent be sent to all affected organizations. This notice provides an opportunity for each organization to identify Subject Area users and to invite them to participate in the subject area development/revision. Increased user involvement has in fact been noted. Additionally, SBMS was able to consolidate subject areas in five technical areas in an effort to remove extraneous material as well as improve the conciseness of information presented. Data indicate that the number of subject areas is actually starting to decrease. SBMS made strides in improving navigation by the addition of several new portals that are designed to assist Project Managers, line managers, etc. The Laboratory also is continuing to institutionalize IOPS as a key portal to translate SBMS requirements to benchtop application. Through the cost sharing that results from joint development and infrastructure support of SBMS with other Laboratories the management system has been able to maintain and even reduce some costs while continuing to enhance overall system performance.

**Status:** This area will no longer be tracked in the year-end self-evaluation report. The SBMS Management System will continue to monitor progress within their Self-Assessment program in FY2001 working in conjunction with their DOE-RL counterpart.

#### **2.1.4 Information Protection**

Information includes client provided information and PNNL-generated information. Client provided information has National Security aspects and proprietary aspects. PNNL-generated information has these two characteristics as well as business strategy information. Protection of the information should be addressed from a systems viewpoint considering DOE Safeguards and Security requirements, sensitivities of industrial customers, staffing strategy, work location, work assignment, computing infrastructure (including internet), and the Laboratory Agenda. A systems approach looking at the costs/impacts/benefits of different approaches to information protection considering all of these factors is needed.

**Progress in FY2000:** The Laboratory was not able to make as much progress on this issue in FY2000 as desired. In fact, issues concerning information protection were identified in our Fiscal Year 2000 Management Control Program letter to DOE. Additionally, there is an indication that staff conduct of operations for management and oversight of classified information needs to be strengthened. Substantial progress under the FY2000 OII entitled, "Safeguards and Security (SAS) Management System and LAI Consolidation" has been made. This OII effort to consolidate classified "paper" activities into one facility should help with a component of the overall issue, and will continue in FY2001. Improving the guidance provided to staff should also help reduce our vulnerability. Additionally, we have made a firm commitment to appoint a coordinator to lead the effort to effective implementation. Management attention needs to continue in FY2001.

**Status:** This issue will remain a key focus for FY2001, progress will be addressed in the FY2001 year-end report.

### **2.2 Additional Areas for Improvement Highlighted in FY1999**

An assessment of both our report and DOE's FY1999 evaluation indicated that several additional opportunities for improvement existed. These areas are presented below along with progress to

date and disposition. Those areas that we believe still need senior leadership attention will continue to be addressed in future year-end reports as appropriate. Those areas where we believe we have made solid progress, and that we believe have been sufficiently institutionalized will be tracked within the appropriate organizational self-assessment program(s).

The following additional areas for improvement were highlighted:

### **2.2.1 Integrated Safety Management (ISM) Flow-Down to the Benchtop**

Hazard analysis for bench-level activities is not fully coordinated, always understood by staff, or consistently implemented.

**Progress in FY2000:** Progress has been made in this area. In addition to continuing the implementation of IOPS at PNNL, the Hazard Analysis Decision Process and related process requirements document were developed. The "Hazard Analysis Project Management Plan" has been revised. Both the "Institutionalization of IOPS" and the "Hazard Analysis Initiative" will continue as Operational Improvement Initiatives in FY2001 (Institutionize IOPS was a funded OII in FY2000 as well). The Laboratory recognizes that this is an initiative with a 2-3 year time horizon. We still see instances of issues with work control occurring at various times.

**Status:** Progress will continue to be monitored and will be included in FY2001 in the year-end report.

### **2.2.2 Cost Management**

Application of cost management techniques has kept PNNL's rate structure stable but improvements are required to enable future business growth.

**Progress in FY2000:** Cost management was identified as an area for improvement in several of the Sector/Subsector FY2001 business plans. After significant cost reduction efforts in FY1995 and FY1996, management believes that improvement in cost effectiveness lies in growing the scientific revenue base of the Laboratory. In that sense, progress has been made with a net increase of approximately 50 staff hired into our technical divisions. We recognize that growth has a long time horizon. At the same time cost management has become a Lab Agenda item with the intent that appropriate aspects become institutionalized. Cost reduction progress has been made through improvements to our travel and purchasing programs, implementation of site-wide banking services, sharing of SBMS, implementation of a new property management system, more appropriate Site cost allocations, and an in-depth review of overhead budgets. We recognize the need to continue to focus on growing the technical base of the Laboratory while improving the effectiveness and efficiency of our core processes.

**Status:** Progress will continue to be monitored and will be included in the FY2001 year-end report.

### **2.2.3 Continuity of Senior Management within the Laboratory**

This was an issue highlighted in the DOE year-end evaluation of Battelle. The need to work closely to ensure that progress made to date is sustained was emphasized.

**Progress in FY2000:** All senior leadership positions, resulting from staff transfers to support other Battelle laboratory contracts, were filled. Working closely with DOE-RL, our partnership

was maintained such that the Laboratory was able to continue to make progress towards its objectives. Our progress can in fact be seen throughout this year-end report. Additionally, the RL Customer Satisfaction Survey results reaffirm that continuity and improvement have been sustained. Battelle recognizes that forging a strong and meaningful partnership with DOE-RL is an ongoing process. We will continue to focus on relationship building in FY2001 and beyond.

**Status:** Our relationship with DOE will be monitored using existing tools such as survey, direct communication, etc. This area will no longer be tracked as a key area for improvement in this report.

## **2.2.4 Equal Employment Opportunity Diversity Program**

Although DOE commended our efforts in their year-end report for FY1999, it indicated that improvement was still needed.

**Progress in FY2000:** Significant progress was made in this area. A direct outcome of our efforts resulted in an increase in hiring of women and minorities by 25% as compared to FY1999. A Laboratory-wide Diversity training program was developed and implemented; more than 90% of our Laboratory staff received this training. The Diversity training program has also been incorporated into PNNL's on-line Laboratory Orientation, so new hires will receive this valuable information in the future. Diversity performance objectives and indicators orientation were provided to the Human Resource Managers (HRMs) to facilitate inclusion of EEO/AA and Diversity POIs into Division and Directorate self-assessment plans. We have continued to enhance our Nez Perce relationship. PNNL S&Es participated for the second year in the Nez Perce Preparing for Academic Excellence summer Math and Science camp. Partnerships are being formed to support educational outreach for underrepresented youth, including 3 Native American Tribes, HAAP, African Americans for an Academic Society (AAAS) and MESA. PNNL and HAAP will jointly work on the 2001 HAAP awards banquet. Additionally, the PNNL Diversity Program Office worked with the Science Education Program and Community Relations Office to increase distribution of SRAP program information to local schools. A direct result of this effort was an increase in students in our summer program. Forty-five PNNL S&Es gave 98 presentations to 3,025 K-12 students in the Tri-Cities and Sunnyside. Fifty-five of those presentations targeted minorities and young women and reached 717 students in grades 6 through 12. We have developed relationships with the Hispanic Outreach Leadership Alliance. Further, working with the Minority Advisory Council, PNNL has also set a strategy to continue our focus on education, access to opportunities, and communication/visibility. Our efforts in all the areas highlighted above will continue.

**Status:** This area will no longer be tracked as a key area for improvement in this report. The HR Management System will continue to monitor progress within their Self-Assessment program in FY2001 working in conjunction with their DOE-RL counterpart.

## **2.2.5 Integrated Assessment**

The need to continue to strengthen the Integrated Assessment program was mentioned in several portions of the DOE year-end report. The key themes mentioned were integrating assessment plans and results at the Laboratory level, strengthening the connection of self-assessments to the Laboratory strategy, continuing to increase deployment, and further strengthening of corrective actions.

**Progress in FY2000:** Progress to date has been strong. In FY2000 key elements of Integrated Assessment, specifically the reporting of key results from current assessments as well as the setting of new Performance Objectives and Indicators (POIs) based upon strategy, were merged with the Integrated Planning process. The Laboratory is positioned to collect, analyze and disseminate cross-cutting information more effectively. This integration also reinforces the connection of results, as well as new POIs, to both the organization's and the Laboratory's strategy. Additionally, deployment is enhanced since business plans are developed by each customer service model component as well as each management system. Finally, this integration also serves to better connect improvement actions to strategy utilizing lessons learned from previous assessment results. This first year focused on implementing the process. Future emphasis will be placed on making the process easier to understand and implement. A review that was conducted by an external subject matter expert confirmed that our Laboratory-level self-assessment measurement process is sound and on par with Baldrige award winners. However, the reviewer also confirmed that our Laboratory-level analysis process is relatively immature. Other independent assessments (e.g., I/O, Facility Representatives) have reinforced this point. Emphasis will be placed on strengthening the quality of analysis we deliver and how we communicate our performance across the Laboratory.

**Status:** Progress will continue to be monitored in and reported in the FY2001 year-end report.

Although several other areas were identified, in FY1999 those issues identified above were considered to be the most critical from a Laboratory perspective. Most if not all areas identified were incorporated into appropriate organizational self-assessment plans and either exhibited improvement or were cited as being carried forward into FY2001.

## **2.3 Areas for Improvement Identified in FY2000**

### **2.3.1 Price Anderson Amendments Act (PAAA) Program**

The PAAA program continues to mature, however, we believe that we need to make additional progress in FY2001. PAAA guidance is generally well integrated into SBMS and awareness is improving across the Laboratory. Laboratory managers have appropriate understanding and involvement in PAAA issues. Our WebReq and Electronic Prep and Risk tools are mechanisms for identifying the work where PAAA applies. In FY2000 several modifications were made to the Acquisition Management System (e.g., new clauses, improved WebReq tool, subject area revision, training) to identify PAAA requirements and that such requisitions are effectively or consistently flowed down from the Laboratory to its subcontractors and suppliers. However, organizational review of self-assessment results for PAAA noncompliances and noncompliance trending needs to be strengthened. There is also a need for enhanced training and better tools to help staff across the Laboratory better implement their PAAA self-assessment responsibilities. In FY2001 an assessment to determine the impact and use of the modified processes and tools will be conducted to determine if these modifications have produced their desired outcome. Because of the importance we assign to this program, progress will continue to be monitored in FY2001 and reported in the year-end report.

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### 2.3.2 Travel Risk Mitigation

Several assessments have identified a need for improvement in the way the Laboratory prepares staff for and manages the risks associated with off-site travel activities. For foreign travel, a subject area exists in SBMS and the projects that are foreign travel intensive have implemented project specific procedures. The assessments concluded, however, that the Laboratory's approach needs to be more consistent and possibly adopt practices from the projects. For off-site activities there is no subject area defining how to identify and mitigate the specific risks. In FY2000 the Off-Site Travel Working Group was formed. The multidisciplinary group was empowered to consider safety and personal security issues and improvement opportunities associated with the management of business-related off-site travel risks. The Working Group is charged with identifying and prioritizing issues related to off-site business travel by PNNL staff and making recommendations to line management, and appropriate management system owners regarding needed improvements, priorities, and funding levels. Little substantive progress was made by the working group in FY2000. There is a need for management attention in FY2001.



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**Part III**  
**Assessment of**  
**PNNL Self-Assessment Program Maturity**

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# Assessment of PNNL Self-Assessment Program Maturity

## Introduction

The Pacific Northwest National Laboratory's (PNNL) vision is to be among the world's premier research laboratories, distinguished by its scientific excellence, known for solving the U.S. Department of Energy's (DOE) most critical and challenging problems, widely recognized for operational excellence, and highly valued by the community and region in which it operates. In order to achieve this vision we recognize that we must effectively articulate our strategy and manage performance toward that strategy. This is the foundation upon which our Integrated Assessment Program and Integrated Planning process are based. A key component of Integrated Assessment is self-assessment. To attain our vision we must be proficient in the use of self-assessment to drive continuous improvement. For that reason it is important that we continually assess the progress we are making in maturing the self-assessment program.

## Background

In the years leading up to FY1999 we focused primarily on evaluating the degree to which each division and directorate implemented a self-assessment process. This evaluation was done using internal subject matter experts. The key performance objectives that united us were the Laboratory-level Critical Outcomes. In FY1999 we shifted to an evaluation of how well the divisions and directorates used assessment to drive business results, in addition to how effective their self-assessment processes were. This evaluation was done principally using internal subject matter experts with assistance from two external experts. Here too the primary performance objectives that united us were the Critical Outcomes. However, a shift was occurring in which the Laboratory Agenda was more clearly articulated and divisions and directorates were beginning to more systematically align their annual performance objectives to it. This evolutionary process continued in FY2000.

## Today

In FY2000 the Laboratory recognized that it was time to forge the connection between planning and assessment. This was accomplished by incorporating organizational assessment results and the inclusion of performance objectives, indicators and expectations into the business plans. By taking this step we recognized that we would strengthen the link between what we plan and what we do. We also recognized that this change would ultimately allow us to better analyze and share results across the Laboratory. At the same time we recognized that this change would not be easy and initially it would not work out perfectly; lessons would need to be learned and used to improve the process in FY2001 and beyond. An analysis of the results indicates that we achieved our expectations for this pilot year, and we will press on with further refinements in FY2001 and beyond.

Several results support our conclusions. A Laboratory-level evaluation of the self-assessment program was conducted by an external subject matter expert using a nationally recognized comparative framework (please see Critical Outcome 3.0 in Part I of this report). Results from the FY2000 RL Customer Satisfaction survey enable us to understand self-assessment maturity as viewed by our DOE-RL customer. The results from special studies conducted by Independent

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Oversight (I/O), which include an evaluation of external oversight activities, provide us with an independent view of progress. Finally, we have our own internal analysis of the self-assessment portions of the business plans to help us understand our progress.

## Analysis

**External Evaluation:** Based on the results of the independent evaluation, the Laboratory's performance measurement system rivals what a typical Baldrige Award winner would score in the area of Measurement of Organizational Performance (60%). In the area of Analysis of Organizational Performance, the Lab was rated as being in the beginning stages (20%). Overall, the Laboratory achieved a score of 39 points, one percentage point below an excellent rating, and therefore achieving an overall rating of Good. The report also indicated that in order to improve our performance we must strengthen our ability to analyze information and share the results more broadly and systematically. In addition to evaluating PNNL's performance measurement system, the independent evaluator also provided a brief comparison with two other national laboratories and two Testing and Evaluation organizations. Overall, the evaluator felt that Battelle's performance measurement system was the most comprehensive and mature in comparison to the other organizations.

**RL Customer Satisfaction Survey:** Results from the RL Customer Satisfaction Survey indicated that 85% of our RL customers rated their satisfaction with our use of assessment results to effect improvement as "Excellent" or better. This is significant improvement over the FY1999 rating of 55% and indicates that more of our customers are seeing evidence of self-assessment being valued and used as tool to continually improve performance. The majority of our DOE-RL customers (90%) also rated the alignment between PNNL's self-assessment performance measures and the strategic goals of the Laboratory as Excellent to Outstanding.

**Independent Oversight (IO) Special Studies:** Results from the I/O special studies indicate that the Laboratory is moving toward its goal of becoming the benchmark laboratory with respect to self-assessment. Self-assessment processes have continued to mature and are being actively used to evaluate customer satisfaction as well as effectiveness and efficiency. A significant shift in attitudes is occurring in which assessment is viewed as a tool for evaluating work and improving performance, as opposed to being viewed as a requirement (or end in itself). External oversight reports did not identify any significant programmatic issues that had not previously been identified through the Integrated Assessment program. The I/O studies also served to reaffirm our areas for improvement. We need to continue to mature the selection of measures, strengthen and systematize information analysis, and improve how we communicate and share results. These special studies indicated that we have further work to do in improving the subject areas that support Integrated Assessment so they are more useful to staff. Finally, results from these studies indicate that the Laboratory needs to increase emphasis on compliance to requirements.

**Analysis of Business Plans:** Our analysis of the business plans is continuing. As of this writing we have noted the following points: several business components had difficulty in making the transition while others did an exceptional job of articulating results as well as new performance objectives and indicators (POI's). In many cases, alignment between assessment results and POI's and linkage to Lab-level strategies was strong. There was also a healthy balance between opportunities for improvement identified in FY2000 and the POI's set for FY2001. A reasonable balance of POI's was noted (i.e., metrics covered customer, staff, organizational effectiveness, financial,

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regulatory, strategic, and community criteria). However, there were also business components that articulated very little performance related information. In such cases we could not evaluate alignment and overall balance. This could be due in part to the guidance and tools provided to business planners. The results indicate that there is room for continuous improvement.

Overall, results indicate that the Laboratory is making solid progress in the continued maturity of self-assessment. Our ability to focus on key areas for improvement and to continue to strengthen our processes and tools will serve to drive us to the outstanding performance level.

Integrated Assessment has drafted a path forward that will be reviewed by a Laboratory-wide team. The proposed path forward will then be presented to the PNNL senior management for concurrence.

## **Summary of Progress Made Against Key Improvement Themes from FY1999**

In the FY1999 Annual Self-Evaluation Report, the Laboratory identified five key improvement themes during the Laboratory evaluations. Table 1 below summarizes those improvement themes and the progress that has been made to date.

Table 1. Status of Improvement Areas Identified in FY1999

FY1999 Measurement System Improvement Areas	Evidence of Progress in FY2000
<p>Measurement System Alignment: In many cases, performance measures do not clearly align to support an organization's strategic objectives/intents, management system performance, functional/daily operations, technical thrusts, and Laboratory initiatives.</p>	<ol style="list-style-type: none"> <li>1) As noted by the independent evaluator, one of the Laboratory's strengths in performance measurement is their comprehensive look at overall organizational performance, as well as connection to division, directorate, and group-level assessment.</li> <li>2) Also, an additional question was added to this year's annual DOE-RL satisfaction survey: "To what degree do you see alignment between what your Battelle counterpart is measuring and any relevant strategic goals that the Laboratory is trying to achieve?" In response to this survey question, 90% of the respondents rated alignment as Excellent to Outstanding."</li> <li>3) An I/O Special Study found that "...strategic planning and critical outcomes are effectively linked during the business planning cycle and provide feedback on major elements related to Laboratory performance".</li> <li>4) Analysis of business plans indicates that many business plans show linkage between POIs and both the Laboratory Strategy as well as the component strategy. However, the degree to which each business component adequately addressed the information requested was uneven.</li> </ol>
<p>Cost of Improvement Options: In many cases, it is not clear how a cost or financial understanding of improvement options is developed.</p>	<ol style="list-style-type: none"> <li>1) The Laboratory's Operations Improvement Initiatives (OII) process includes the following criteria to evaluate improvement options submitted as proposals to the Laboratory's Leadership Team: impact/value to the Laboratory; return on investment; management system budget reductions; alignment with Laboratory strategy; urgency; and cost/difficulty to implement.</li> <li>2) Additionally, a separate section in the business plans asks specifically for information regarding improvements planned in the next fiscal year that will utilize existing resources (i.e., non-OII).</li> <li>3) The analysis of the business plans indicated that several organizations were able to articulate how certain process improvements were able to reduce costs (e.g., Finance, SBMS). Other organizations were able to identify how additional investment might improve the utility of a process or tool across the Laboratory (e.g., Integrated Assessment, Training and Qualification).</li> </ol>
<p>Use of Comparative Data: In many cases, comparative data from external competitors (e.g., other national laboratories) or benchmark companies is not used to develop performance measures, set stretch goals, or evaluate the relative value of PNNL's performance. Best practices from other organizations are not used to set improvement objectives.</p>	<p>Comparative data is being used in some areas of Laboratory operations. This is an area where awareness of the value of using comparative data to evaluate organizational performance and to set performance targets is growing. The FY1999 independent evaluation, which included business results as well as performance measurement, brought this to the attention of each of the divisions and directorates. As part of this year's review and analysis criteria for all for all business planning templates, use of comparative data was included. However, we did not provide adequate guidance to business planners to ensure that they would address comparative data if they use it. Also, obtaining comparative data from other Laboratories is a difficult process.</p>
<p>Use of Analytical Processes: With some exceptions, there is little discussion of methods used to analyze data, such as cause-effect correlations, trends, projections, comparisons used to evaluate data and support decision making. Trending performance, however, is prevalent.</p>	<p>As identified by the independent evaluator, the Laboratory is in the beginning stages of data analysis at the Laboratory level. Although a variety of analytical tools are used by different organizations, there does not appear to be a formal, systematic analysis of performance measures critical to the Laboratory's success other than financial performance measures and review of strategic plan accomplishments. Analysis of the business plans submitted reinforced this point.</p>
<p>Deployment/Staff Involvement: The majority of staff are not involved in the development or monitoring of an organization's performance measures. Staff are unclear about how their performance contributions support the achievement of their organization's high-level strategies and objectives.</p>	<ol style="list-style-type: none"> <li>1) As part of this year's independent evaluation of the Laboratory's performance measurement system, deployment of the system was a key part of the evaluation. The Laboratory's scoring band (60%) for measurement of organizational performance describes deployment of the measurement system as "well-deployed, although deployment may vary in some areas or work units."</li> <li>2) By incorporating assessment into the business plans the level of deployment is further enhanced; all components of the customer service model, as well as management systems, submit business plans.</li> </ol>

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# **Appendix A**

## **Results of Peer Review**

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# Results of FY2000 Peer Review

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# Results of Peer Review

## I. Overview of the Peer Review Process

Peer review is one of the most universally accepted methods to determine the direction and assess the quality of science, engineering and technology. As one of the DOE national laboratories, PNNL is committed to the principals and practices of peer review. PNNL's peer review process has both internal and external components.

Laboratory-initiated peer review has three primary components:

- The Division Review Committees (DRCs),
- The Laboratory Review Committee (LRC), and
- The internal peer review of communications sent by Laboratory personnel.

Each Laboratory Division has established a DRC to review its science, engineering, and technology portfolio, and the DRC chairs serve as members of the LRC. Both committees report to the Laboratory Director. Each of the above three components has been formalized and documented by publication in the Laboratory's Standards-Based Management System.

Major DOE programs (usually DOE Office of Science) are reviewed annually by panels of subject matter experts brought to the Laboratory by sponsors of the research. *Ad hoc* reviews are also undertaken by DOE, and there were two of these this year sponsored by OBER for proteomics and life science research.

Finally, the Laboratory also establishes special *ad hoc* internal review committees to address specific submissions of proposals in response to request for proposals (RFPs) for major programs announced by Laboratory sponsors of research and development (usually DOE).

## II. Scope of FY2000 Submission

Included in this report are summaries of the (1) proceedings of the LRC, (2) proceedings of the DRCs, (3) results of DOE-initiated peer reviews, and (4) results of special *ad hoc* internal review committees.

## III. Laboratory Review Committee

The Laboratory Review Committee met with Dr. Lura Powell and her Associate Laboratory Directors (or their representatives) on September 11, 2000. The Director presented an update of the Laboratory's strategic plan and her expectations for the DRC process and the LRC. The format of the LRC meeting was changed this year. Each of the ALDs presented the major issues identified via the DRC process in their respective Division followed by response of the DRC chair. These will become the issues on which the Divisions will concentrate their efforts in responding to DRC reviews and recommendations therein. The major issues of each Division and the results of the LRC meeting are included as appendices to this report.

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## IV. Division Review Committees

Division Review Committees for each of the Laboratory's four technical Divisions met during FY2000. The results of these reviews and the prominent DRC recommendations are summarized below. During this fiscal year, the Laboratory and DOE-RL agreed to share DRC reports and documented the agreement in a formal MOU. As a result, this document will present a higher-level summary than in the past since the DRC reports are readily available to DOE staff interacting with each of the Divisions.

### Energy Science and Technology Division

**Review Scope:** The Division's DRC met May 4-5, 2000. The DRC assigned an overall rating of "Excellent" to the program components reviewed. Program components reviewed were (1) Large Scale Information Integration (LSII), (2) Information Assurance and Infrastructure Protection (Cyber Security), and (3) Information Exploitation.

Each of the programs reviewed was within the Information Sciences and Engineering component of the Division (IS&E). Last year's review was also centered in IS&E. It should be noted that the DRC found "an impressive response to last year's review, across the board." Last year the IS&E was described as "having an identity crisis, the efforts and accomplishments of the group were largely not discussed and there did not appear to be metrics available to evaluate the work." The DRC found that this year the team was able to get a better sense of the kind of work done and that from the presentations of Don McConnell through the remainder of the review there was a much deeper awareness and appreciation of the current work, the capabilities, and the accomplishments of IS&E.

**General Comments on technical programs:** LSII was rated outstanding for engineering and excellent in science. Cyber security was rated good, and Information Exploitation was rated outstanding for science and excellent for engineering. While providing a review of individual components, the DRC also provided feedback with respect to the IS&E overall enterprise. The Division is "paying more attention" to IS&E and has a "better understanding of what the group is doing." The DRC believes that IS&E must continue to define and clarify its mission and address the tension between conducting research while operating as a business. The DRC presented recommendations to address this issue.

#### Specific Comments:

For Large Scale Information Integration (LSII):

- All of the projects within this category have been "well conceived, well managed, and well implemented."
- There is a varying fit of each component with the stated Laboratory mission.
- The components could benefit from cross-fertilization within LSII.
- Overall, LSII offers excellent opportunities to garner new projects, and the progress is impressive. The challenge is to balance practical engineering with basic research. The reviewers commented on these issues under "Science at PNNL" and "Science & Engineering" within the review, and recommendations with respect to these issues were made.

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For Information Assurance and Infrastructure Protection (Cyber Security):

- The Critical Infrastructure Protection Analysis Lab seeks to create a national cyber security asset via threat forecasting. The DRC recommends that a balance of preventative and defensive measures is needed as opposed to favoring defensive measures.
- CISPS/CAT is a group of tools to simulate attack scenarios and intrusion detection. The tools have potential as an internal research aid and recommendations were made on specific items within the tools.
- Advanced Anomaly Detection (AAD) is not yet started and will address insider threats. The reviewers suggest that the current approach should be augmented with more effort to collect and analyze existing information and a comprehensive literature search.
- SCADA was thought to be “a great project” with a sound strategy. Specific recommendations were made.

For Information Exploitation:

- The reviewers thought the quality of science was outstanding and the engineering component excellent.
- There is significant progress in developing innovative and high quality approaches, and the reviewers were impressed with the ability of the staff to recognize problems of scale.
- Recommendations were made with respect to individual components of the program.

**Response to 1999 review:** The DRC “saw an impressive response” to the 1999 review, and details of this response are summarized in the DRC report. The Committee also presented observations and recommendations with respect to review format, organizational issues, professional development, and maturation of Division organizations with respect to their concepts and strategies.

## **Environmental and Health Sciences Division**

**Review Scope:** The review was held May 22-23, 2000. Components of the review included Nanoscience, Toxicology and Chemical Dosimetry, Statistics, and Education & University Relations.

**General Comments:** Nanoscience and Education & University Relations were rated outstanding, and Toxicology & Chemical Dosimetry and Statistics were rated excellent. A great deal of progress has been made in preparing for the DRC meeting and in the format itself, and there were recommendations for some minor refinements for the future. The DRC commended the Laboratory for planning to build a facility to house visitors.

### **Specific Comments:**

For Nanoscience:

- The Federal initiative fits PNNL strengths and a strong effort should be made to attract significant funding from this initiative.
- With a world-class array of instruments and capable scientists in EMSL along with a very capable leader, the Laboratory is well positioned to contribute and should have an impact in this area.
- It was recommended that the Laboratory strengthen nanoscience and consider taking advantage of EMSL to expand into other nanofields.

For Toxicology & Chemical Dosimetry:

- Excellent presentations were made in important and widely recognized potential problem areas.
- There is a clear lack of critical mass in personnel, space, and equipment, and the Lab should commit to ongoing programs by seeking funding for laboratory revitalization, new personnel and new equipment.
- The group should seek collaborations with local universities to accelerate progress in biology.
- A comprehensive and separate review of the Laboratory's entire biology program should be considered.

For Statistics:

- Presentations were well prepared and demonstrated excellent capability and the importance of the subject.
- The DRC believed that more information about the Lab's current and new programs would be a help to the group.
- The Lab should incorporate the Statistics group's desire for growth into its plans and consider whether maintaining an independent group or a formal matrix of the group into Lab programs is the most effective method to deliver the group's services.

For Education & University Relations:

- A comprehensive and well thought out program was presented, and the staff should be praised for their exceptional skills and enthusiasm.
- Importance to the Laboratory was demonstrated since Laboratory organizations supported it with their own budgets after DOE funding was severely cut.
- It was suggested that the Laboratory advertise for proposals to form Joint Institutes in order to market the Lab as well as acquire the best collaborators.

The DRC also made recommendations for next year's meetings both with respect to potential areas to review and the meeting format. The DRC suggested a reexamination of EMSL efforts on marketing, upgrading, and user interfaces to assure the appropriate acquisition of new equipment in a timely fashion.

**Response to 1999 review:** The DRC complimented the Division Director "for his attention to its recommendations."

## **National Security Division**

**Review Scope:** The review was held January 19-21, 2000. Program components reviewed included strategic planning, state of the Division, DoD portfolio, and fifteen individual projects.

**General Comments:** The overall rating assigned to the NSD programs reviewed was excellent/outstanding. The overviews presented were very valuable. Of particular value to the DRC was the presentation by Adrian Roberts, Interim Laboratory Director, which helped place the role of NSD within a broader context of the Laboratory, national laboratories, and Battelle. The DRC also presented suggestions for the format of future meetings.

### Specific Comments:

#### For State of the Division

- The DRC strongly supports the Division Director's process of outreach to the weapons labs and the communications and technical cooperation across PNNL as well.
- The Division is now in a much better position with respect to its strategy to address its tactical issues.
- A number of management decisions have been made with respect to organizational structure and staff relations (for example quality of work life) that the DRC supports.
- The financial performance of the Division is impressive.

#### For Strategic Planning:

- The DRC agrees with primary components of the strategy and the stated content of each. It is the Committee's recommendation that the plan be communicated widely to the technical staff such that it can be used as a common guide understood by all.
- The DRC believes that the strategic plan should now consider incorporating annual goals and objectives consistent with the long term goals. This would provide the mechanism by which the strategic plan can be kept up to date and serve as a tactical guide as well.

#### For DoD overview:

- The overview provided the DRC with the Division's view of key market and operational areas that will provide the basis for strategic and tactical planning.
- The DRC was pleased that PNNL was on the cutting edge of drivers for several specific areas (for example Brigade Combat Team redesign) and the increased emphasis on Space and Space-related drivers. NSD has significant resources to contribute, and the DRC recommended that (1) marketing plans be developed for the new opportunities and (2) new areas of Brigade Combat Team redesign and Space thrusts have their awareness raised. These would exploit NSD's position as one of the leading technology developers within the DOE.
- For future presentations of this area, the Division could assist the Committee by presenting additional information about the linkage of business objectives with projects to be reviewed as well as a budget data (i.e. fraction of sector sales) and how they fit into the NSD strategic plan.

Finally, the DRC recommends continued emphasis on intellectual property identification, protection, and exploitation.

For Individual Projects: The DRC reviewed 15 individual projects with extensive descriptions of each, so it is not possible to include comments of each project within this document. The results of the review have been shared with the investigators of each project.

**Response to 1999 review:** The DRC "notes with satisfaction the response of the Division management to our 1999 review report. It is very encouraging to us that such attention is given to our recommendations."

## Environmental Technology Division

**Review Scope:** The review was held June 7-9, 2000. As a result of the leadership changes in the Division and Laboratory, this year's review had a different focus than in the past. Time was taken to examine the changes and meet with the new management team. In addition, facilitated discussions were held on specific issues.

**General Comments:** The DRC assigned an overall rating of excellent for the Division components reviewed. Significant progress has been made in addressing the concerns of last year's review. The leadership transition is well under way, and the Division management team is supportive of Dr. Apley's efforts. New directions have been established, there appears to be a genuine level of enthusiasm with respect to the Division's future, and the challenges of the past don't appear to have had a major impact on the quality of Division technical work, a tribute to the high quality of the personnel.

### Specific Comments:

For Response to the issues Dr. Apley requested the DRC to address:

- Feedback on ETD strategic approach: The DRC was very supportive of the strategic planning effort noting that it is still in an early stage. This issue and improvement areas defined by Dr. Apley are precisely the ones that ETD needs to focus on.
- Is the transition of ETD proceeding successfully? The DRC gave an emphatic "yes" to the query.
- Is ETD too large? The DRC reply was that if the various Division components could be rationalized in a coherent way, then the Division was not too large. If some groups cannot be justified, then it is too large.

Individual DRC members visited selected technical groups, and the observations are presented below.

- Systems and Risk Analysis: Capabilities are well developed and leadership is stable. The group can be expected to play an important role in ETD. The group is well led and organized and is moving forward to apply its capabilities.
- Natural Resources: Building this capability continues to be a challenge. Such capabilities are needed within the nation, but the projects are small. There is a need for investment in equipment and facilities, and new clients must be identified.
- Process Technology: The DRC believes that the group is very productive and one essential to the success of ETD. It's financial performance, productivity, and commercialization activities demonstrate its effectiveness. Given the group's views on LDRD initiatives, promotion to higher levels, and the balance between staff development and strategic hiring, the DRC recommends that the Division leadership address these issues (both real & perceived) as a matter of good communication and management. To address the frustration of decreasing significance that EM plays in the group's operation, perhaps "solutions" to technical problems should be the market strategy as opposed to selling science and technology to production oriented clients.

**Response to 1999 review:** For Division response to 1999 Committee Concerns:

- ETD staff insecurity & uncertainty: Dr Apley's leadership has been generally well carried out and received, the Division has been reorganized, and Dr. Apley is focusing on several "Issue and Improvement" areas. Much has been done, and much remains to do.

- Lack of effective transition planning: The effort to develop an integrated strategic plan for ETD appears to be a successful counter to the lack of effective transition planning that was noted last year. Now the Division needs to “live the plan.”
- Use of human resource function in the transition process: ETD is taking human resource issues very seriously with their actions and plans. The challenge now will be to assure that the associated information is conveyed to staff by middle management.
- Balance between Battelle and public interests: The DRC believes there is still some philosophical difference within ETD, and management is encouraged to continue discussing how a good balance can be achieved.

The DRC also commented on five issues from last year’s review.

- The progress of last year must be sustained. The management team must respond to varying conditions and learn to work together as well as develop new skills to deal with new customers.
- ETD’s revised vision, mission, and agenda need to be embraced and acted upon by the staff. Significant staff development and communications efforts will be necessary.
- The variety of roles the ETD can play at Hanford need to be better articulated and rationalized. The real issue is how to define the Laboratory’s role so that work does not generate conflicts of interest or exclude other national labs and technical organizations.
- New leadership needs to develop a relationship with DOE-EM. Both senior management and other levels within the Laboratory, ETD, and DOE must establish effective interactions.
- Implementation of the new ETD strategy is a potential opportunity to reduce the number of small projects being pursued in favor of larger projects. ETD should reduce the number of small, sub-critical projects in favor of larger projects.

## V. External Peer Review of PNNL Programs

A number of programs were reviewed under sponsor auspices during FY2000. The results of these reviews are summarized below.

### **Chemical Physics Program, Office of Science, Office of Basic Energy Sciences, Chemical Sciences Division**

**Review Scope:** The review was held in March of this year and is an annual review in which BES projects are examined every two to three years. This year the OBES-sponsored and staffed review of the program had four external reviewers.

**General Comments:** BES was pleased to see the improved interaction between theoreticians and experimentalists as a result of co-location of their offices. The departure of 2 scientists leaves a gap in the experimental program, however, the replacement of one scientist provides evidence that the Laboratory and the Chemical Physics projects are capable of attracting outstanding young scientists.

The four reviewers stated without exception that the EMSL facilities were excellent with well-equipped labs, very high quality science, good collaborations with strong external groups, and an enthusiastic staff. The overall quality of the research is equivalent to the best research carried out in top US universities and national laboratories. Dr. Colson is to be commended for assembling such a talented group.

**Specific Comments:** The reviewers were unanimous in their praise for the work of 2 scientists. They believe that the technical and scientific competence is superb, and is outstanding replacement staff. The work of one scientist was described as in transition and has potential to shed light on important problems.

**Response to review:** BES is pleased that the personnel issues discussed at previous reviews have been positively addressed. They anticipate that personnel issues that surfaced in this review will be similarly handled stating that those issues “are well within the purview of Laboratory management to address purposefully.”

### **Materials Science Program, Office of Energy Research, Office of Basic Energy Sciences, Materials Science Division**

The results of this year’s review are not available. The Laboratory finally received the results of the FY1999 review in February of this year. The report below is derived from the FY1999 review.

**Review Scope:** The review was held June 9-10, 1999. This is an OBES sponsored and staffed review where projects are reviewed every two to three years. This review covered the “Defects in Metals and Ceramics” projects.

**General Comments:** The science is excellent and facilities are outstanding. The EMSL provides an unequalled collection of techniques and tools. Many of the BES/DMS programs are using these facilities to greatly enhance the quality of research.

#### **Specific Comments:**

- **Molecularly Organized Nanostructural Materials (J. Liu)** The program addresses fundamental issues, and the researchers are pioneers in the area of research touted as a worthy challenge by BESAC. The program had strong endorsement from all reviewers.
- **Fundamental Studies of Stress Corrosion and Corrosion Fatigue Mechanisms (R. Jones)** The group got high marks for what it does best. It is a first class metallurgical investigation. The reviewers did recommend that the group use the full range of analytical tools at EMSL and have more of a presence at other types of scientific meetings in order to not miss out on other ideas and to increase its visibility.
- **Irradiation-Assisted Stress Corrosion Cracking (S. Bruemmer)** This is one of the outstanding programs that study the mystery of materials failure. The group brings a superb scientific approach to a complex and difficult problem.
- **Chemistry and Physics of Ceramic Surface (G. Exharos)** The EMSL laboratory and equipment are impressive, and the research is state-of-the-art. Significant progress has been made, and the team appears to have a well-conceived plan for future studies.
- **Interfacial Dynamics during Heterogeneous Deformation (S. Bruemmer)** The modeling work is brilliant, and the important phenomenon studied is not investigated with such depth and breadth anywhere else. The studies carried out in this project are unrivaled.
- **Bulk Defects and Defect Processes in Ceramics (W. Weber).** This program was described as “getting more than what you pay for”. It exercises leadership in the field, and its accomplishments “would embarrass another program funded at five times this level.”

BES noted four management issues:

- The staff is spread too thin. The BES/DMS staff person noted that this is a problem shared by all the DMS laboratories and results from flat DMS funding and the funding of new programs coincident with reluctance of DMS/lab managers to cut productive programs.
- There is a perception that PNNL programs are tilted toward applied research. While one of the reviewers stated that lab management appears to have controlled this to date, BES is not as confident as the reviewer. This is an issue that will require constant management attention and finesse.
- Management has not capitalized on external expertise in basic materials sciences. BES believes that PNNL scientists can hold their own and can benefit immensely from critical reviewers knowledgeable in basic sciences.
- Basic research in materials science lacks visibility on management's screen.

**Response to review:** To address the above management issues, BES suggests that (1) in out years' reviews, PNNL should invite reviewers with expertise in basic science, (2) make BESAC attendance a high priority, and (3) PNNL should take seriously the submission of reports to BES on important scientific findings in the form of weeklies, accomplishments, and items for "bullet shootouts." PNNL has implemented measures to address all three recommendations.

### **Peer Review of New Proposal Submissions**

**Environmental Management Science Program (EMSP):** DOE has yet to formally announce the winning proposals. However, indications are that, 25 proposals for a total of \$25M will be supported, subject to change as a result of Congressional action. Four of eleven PNNL-led proposals were selected as well as 1 out of 7 proposals lead by other institutions but in which PNNL staff participated. Total funding expected by PNNL is \$3.75M or 20% of all renewals granted nationwide and 30% of available funding.

**Natural and Accelerated Bioremediation (NABIR):** PNNL had five projects funded for a total of \$915K. The Laboratory also has continuing funding for projects that were not up for renewal. PNNL continues to be the institution with the largest NABIR-sponsored portfolio.

**Experimental and Computational Structural Biology:** This OBER program sponsored a competition for \$5M for national laboratory participation. PNNL won a \$1.0M project in structural genomics. This is a research topic for which PNNL has not been funded in the past but which has become an extremely important research topic in the post-genome era following the recent public announcement of the draft human genome by DOE & NIH. It will utilize EMSL's NMR capabilities in new and important research.

**Office of Biological and Environmental Research Proteomics Review:** In January, a special review team was commissioned by OBER to review the Laboratory's proteomics capabilities with respect to Dick Smith's mass spectrometry technologies. As a result of that review, BER funded a \$1.1M pilot project to develop and demonstrate technologies and determine the proteome of *Deinococcus radiodurans*. The project was reviewed again on August 17 to determine if the project had met its milestones. The review was an outstanding success. The project met all of its milestones (most ahead of schedule) and on budget. As a result, the Laboratory received a \$1.5M allocation to continue the proteomics work in FY2001 and the commitment for a \$1.5M capital equipment allocation to acquire the equipment necessary for a dedicated effort. In addition, this success was a significant factor in the decision by OBER to name PNNL as one of two Laborato-

ries (ORNL is the other) to become new members of the Joint Genome Institute (JGI) together with the original members (LANL, LLNL, and LBNL). The JGI is the primary DOE facility associated with the Human Genome Project. PNNL completely missed any participation in the Human Genome Project. Selection for membership in the JGI assures that the Laboratory will be a leading participant in the post-genome programs that will determine the identity and function of proteins encoded by the genome. The importance of this accomplishment to the future of biological science in the Laboratory cannot be overstated. It was a crucial and wonderful win.

**Office of Biological and Environmental Research Life Sciences Review:** In February, a special review team was commissioned by OBER to review life science capabilities at the Laboratory. As a result of that review, the environmental microbiology group will become the lead laboratory for the newly created Microbial Cell Program within OBER. OBER has made commitments to fund microbial research and support a leader upon his/her hire. With OBER's encouragement and support, the Laboratory has proposed a new LDRD Initiative in this area with the expectation that it will quickly lead to new OBER programs in environmental microbial biology.

It is important to note that the review team also suggested to the Laboratory that it concentrate its research on microbes and not on higher life forms. Had the Laboratory interpreted that input literally, it would not now be able to adequately exploit its membership in the JGI. Discussions with the JGI on September 26 on the formalization of the PNNL/JGI relationship via an MOU has validated that the JGI is most interested in pursuing those PNNL capabilities dealing with complex organisms, namely expression of proteins and derivation of antibodies from them in addition to the proteomics work that will inevitably include proteomes from complex organisms up to and including humans.

## VII. Overall Assessment of Results of Peer Review

The Laboratory continues to honor the commitment to institutionalize peer review and utilize the information acquired to improve both the peer review process and the quality of science, engineering, and technology. It is important to note that interactions between Laboratory and DOE-ERL staff during formalization of the peer review program led to creation of a program in which the process itself and the utilization of derived information are the most important elements. The descriptors/rankings applied to the science and technology work reviewed are useful and informative to identify issues that must be addressed but in themselves neither drive the process nor provide its most important product.

During FY2000, all Laboratory commitments with respect to peer review were completed:

- **Laboratory Review committee (LRC):** The annual LRC meeting was held September 11, 2000. The results of the meeting are attached as appendices. They will be the basis for selected action items to address the issues raised.
- **Division Review Committees:** The Laboratory-initiated external peer review by DRCs was completed. DRCs of each of the Laboratory's four technical Divisions met during the year and reports of the review results were prepared and communicated to the Divisions. Performance descriptors assigned were: "Excellent" for the Energy Science and Technology Division, "Excellent-Outstanding" for the Environmental and Health Sciences Division, "Excellent-Outstanding" for the National Security Division, and "Excellent" for the Environmental Technology Division. Each of the Divisions responded to DRC to the issues and recommendations of the previous year's DRC meeting, and without exception each DRC specifically noted in its report the quality of the Division response.

- **Sponsor-initiated review of PNNL Chemical Physics program:** The BES division director of Chemical Sciences noted “we continue to be pleased that the program in Chemical Physics at PNNL has achieved national recognition for excellence, and we expect continued achievement at this high level in the future.”
- **Sponsor-initiated review of Materials Science Program:** The cognizant BES program manager summarized the results of the review rating the science “Excellent” and the facilities “Outstanding.”
- **OBER-initiated review of proteomics and life science capabilities:** As a result of the special reviews, the Laboratory acquired a funded proteomics effort, was named a new member of the Joint Genome Institute, and received an OBER commitment to support as a lead laboratory PNNL’s environmental microbiology program. Together with OBER’s structural biology program, this year’s successes in programs sponsored by OBER’s Life Sciences Division will dramatically increase funding from that Division. This is an extraordinary recovery from the loss of all funding (approximately \$4M) from that division a few years ago. This success is extremely important to the Laboratory’s future in the biological sciences as described by Dr. Lura Powell at this year’s Office of Science on-site review.

The Laboratory’s performance in “Results of Peer Review” is outstanding. All commitments were completed. The Laboratory Review Committee and Division Review Committees discharged their responsibilities. Each Division responded to DRC observations/recommendations from last year’s review, and this was noted specifically in each Committee report. All sponsor-initiated reviews were completed and actions taken on the recommendations. The performance descriptors applied by the DRCs to Divisions activities ranged between “Excellent to “Excellent/Outstanding.” The Laboratory’s success in attracting new programs through the DOE Request for Proposals mechanism and special ad-hoc reviews was superb as validated by the proteomics success, selection of PNNL for membership in the Joint Genome Institute and the environmental microbiology group’s positioning for “The Microbial Cell” program.

### Appendix 1 Laboratory Review Committee

Following is a summary of the September 11, 2000, meeting of the Laboratory Review Committee. DRC chairs present were David Kasik (ESTD), Lou Ianniello (EHSD), Carl Poppe (NSD) and Ed Berkey (ETD). Carl Poppe represented Gregg Choppin, and David Kasik represented Denise Denton.

### Presentation of Prominent Issues of Each Division

Each of the ALDs presented the major issues of their respective Division with input from the respective DRC chair. These issues are summarized in Appendix 2. From these presentations were derived the issues summarized below.

- **Strategic planning:** It was the opinion of the LRC that in their experience PNNL has by far the best strategic planning of all the National Laboratories. It was noted that PNNL has a great deal of information that must be managed at the Laboratory level but which must be shared with the staff. Action: It was suggested that middle management make a concerted effort to share the Laboratory strategy with their staff.
- **Recruiting new staff:** While the LRC acknowledged that PNNL will always have to deal with the issue of its location, the best recruiting tool was the availability of world-class science and technology and that investing in important S&T and exploiting strengths like EMSL is the only

long term solution. Maximizing the benefits from programs like the postdoctoral and staff development programs, hiring incentives, and assistance for two career families will also make valuable contributions.

- Commercialization and IP: With the inevitable tensions, the Laboratory should continue to devote high-level management attention to the associated issues. Action: A specific recommendation of the LRC was communication to the staff of the Director's position that serving the DOE and its missions are the Laboratory's prime objectives and that other work cannot interfere with that.
- Increase visibility of the Laboratory: The LRC stressed the importance of education and university relationships. They concurred that formation of joint institutes mentioned by the Director would help in this regard. Simply packing up and taking shows on the road is also both effective and necessary.
- DRC formats: It was the opinion of the LRC that the Divisions are adapting their reviews to fit the personality of the organization, and the meetings are becoming more effective as experience is acquired.

#### Ways to link individual DRCs with each other to enhance their impact

It was the unanimous decision of the group that this could best be accomplished by scheduling a 30 minute "state of the Division" briefing by the ALD from another Division at each of the respective Division Review Committee meetings. Action: This will become a standard feature of each DRC meeting.

#### Closeout Discussion

- The LRC liked the format of this meeting better than those used in the past.
- DRCs are functioning well with no significant changes needed.
- Request was made to share the summary of prominent issues and the Division actions taken with the DRC members at the next meeting.
- A request was made that the Divisions share the reports of non-DRC reviews with the DRC.
- For the next LRC meeting, it was requested that the Division chairs share comments received by their respective Committee members regarding the prominent issues identified at this meeting.

### Appendix 2 Prominent Issues of the Technical Divisions

#### Prominent Issues of Each Division

Following are the most prominent and recurring issues identified by each of the ALDs for their respective Division. These were shared and discussed during the September 11, 2000, meeting.

#### Energy Science and Technology Division

The ESTD review focused on the Information Technology aspect of the Division portfolio. The key issues raised in the peer review included:

1. Development of a coherent, common software architecture that crosses all three major thrust areas and serves as the foundation for a distinctive, integral software architecture.
2. Developing a culture and processes that promote and capitalize on cross communication between developers and across programs.

3. Evolution of the product line/organizational structure to clarify the role and recognition of information science & technology at PNNL.
4. Clarification of the key thrusts and approaches in cybersecurity to reflect the broader views and state of development in this area across industries and agencies.
5. Development of a clear information sciences foundation strategy that will support the growth and stature of the Laboratory beyond expert applications development to breakthrough technology development.
6. Enhancing the visibility of PNNL information sciences through enhanced publication and presentation efforts.

### Environmental and Health Sciences Division

1. Equipment upgrades are critical for EMSL to remain a forefront user facility. The Laboratory should strengthen efforts in nanosciences to promote these capabilities and facilities and position the Laboratory for the national initiative.
2. Health Sciences. There is a clear lack of critical mass in personnel, space, and equipment in the biology portfolio. The Laboratory needs to focus considerable effort in this area to attract high-level researchers. There is a real need for significant laboratory renovations in 331. A strong university partner in biology would give the Laboratory needed recognition in this competitive area.
3. Recruiting and retention of high quality staff. At higher levels in particular it is hard to compete.
4. Organizational Structure of Division and how it fits in to the overall structure of the Laboratory. How do resources impact the Laboratory agenda? Fragmentation of materials research. Integration of statistics group.
5. Meeting Format. More interactive and longer (2 days instead of 1.5) in order to cover material sufficiently. One potential format would be to have the person in charge of the technical area being reviewed give an overview to show how everything fits together at the group or department or research focus level and brief synopses of the different projects in the group. This would be followed by a poster session where reviewers can talk and interact with specific researchers at the project level.

### National Security Division

1. Continued effort on Strategic Planning
  - On-going implementation of the Customer Service Model (CSM)
  - Implementation of business thrusts through the CSM
  - Division "Theme"
  - Identification of the next major program
  - Managing BMI vs. PNNL business strategies
2. Increasing Visibility
  - In Washington DC with DOE/Congress
  - National level presence through magazines and press releases
  - In Washington State through schools, universities
3. Commercialization Strategy
  - Meeting BMI goals while maintaining PNNL DOE focus
4. Recruiting and retaining staff
  - Particularly in information technology

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## Environmental Technology Division

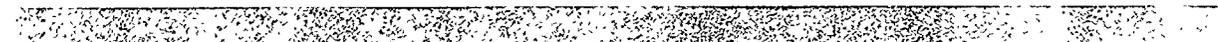
1. The Division must sustain the progress of the 1st year with a new management team.
  - Senior manager transition going well, ensure this is continued
  - Need to live the plan and “walk the talk” through allocation of resources
  - Must continue improving communication to the troops, reduce/eliminate clay layers, continue staff development efforts (succession planning, peer review)
  - Need to clarify public institution role vs BMI interests to diffuse tensions and smooth transitions
2. Need the vision/plan embraced and acted upon by the staff
  - Project fit/selection must fit with vision/plan
3. The variety of roles that PNNL/ETD can play at Hanford needs to be better articulated (need “down field blocking” at the Director and ALD levels)
4. New PNNL and ETD leadership needs to develop relationship with EM at various levels
5. Implementation of the ETD strategy is an opportunity to pursue larger initiatives

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# **Appendix B**

**Operational Improvement Initiatives (OII)  
for FY2000**

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## Summary of FY2000 Operations Improvement Initiatives (OII)

### FY2000 Operations Improvement Initiatives

The set of FY2000 operational improvement initiatives summarized below has moved us closer to our strategic objective, which is “to become the benchmark standard for Laboratory Management.” We strive to create an integrated set of management systems that facilitate and enable effective research and technical interaction by providing staff with useful, cost-effective, and “hassle-free” work processes. These initiatives were developed as an integral part of the Laboratory’s planning and assessment processes. The initiatives were selected and approved by the Laboratory Leadership Team based on their potential impact on the Laboratory objectives and performance. Each of the initiatives had a Level-1 sponsor and a project manager. The project manager developed and implemented a project plan and reported progress on a monthly basis.

### Library Breakthrough Team

**Accomplishments:** The team’s recommendations were presented to the Leadership Team on May 9, 2000. The recommendations included the following:

- Increase access to journals:
  - Increase library core budget to cover journal inflation (FY2001 budget request was authorized)
  - Provide journal articles at no cost to researchers (not approved)
  - Investigate Library applications of PNNL-developed data analysis tools (authorized to explore and request appropriate funding)
  - Review journal subscriptions in divisions for possible cost savings or additional access; increase awareness of the Library’s resources; and obtain and analyze additional data to improve decisions on collection additions and deletions (authorized to continue per team’s detailed recommendations)
- Make/Buy: do not outsource entire library operation; continue to outsource specific functions; develop Serials Acquisitions Request for Proposal (RFP); outsource large cataloging projects.
- Feasibility of PNNL fully funding the Technical Library (recommendations approved pending future site service negotiations).

### Impact/Benefits:

- **Impact/Benefits to Research & Development (R&D) Staff:** Increased access to scientific and technical journals will directly support research and development and IP commercialization efforts through effective searches for science and technology development and discoveries reported in the open literature.
- **Impact on cost reduction or avoidance:** The Library Breakthrough Team’s recommendations will result in soft savings to R&D organizations and projects by providing desktop access to technical journals and bibliographic databases, reducing their need to incur Dialog and STN online search charges.
- **Impact on Intellectual Property:** Increased access to scientific and technical journals will directly support IP commercialization efforts through effective searches for technology development and discoveries reported in the open literature.

## Year 2000

**Accomplishments:** The PNNL Y2K team and all its supporting cast of employees successfully transitioned into the year 2000 and through the Leap year roll over. These successes resulted in the best-planned Y2K non-event that could be expected.

**Impact/Benefits:** Transition to the Year 2000 was a non-event.

- **Impact/Benefits to R&D Staff:** Supported the Division's reporting requirement to DOE and provided additional tools and finance to adjust systems for the Year 2000 transition.
- **Impact on cost reduction or avoidance:** Eliminated risk associated with Year 2000.
- **Impact on reduced risk / increased compliance:** Increased compliance with DOE and Congressional Mandates.
- **Impact on other National Labs and Battelle:** Supported BMI activities and provided education and guidance.

## Institutionalize Integrated Operations (IOPS)

**Accomplishments:** Continued deployment of the IOPS concept and electronic tools to the 320 building and 350 complex staff. This marks the third year of rollout for the IOPS tool under OII funds.

**Impact/Benefits:**

- **Impact/Benefits to R&D Staff:** Training and laboratory access are linked to an individuals requested level of interaction with hazards in the workplace. IOPS self-assessment process drives hazard inventory update and continuous evaluation, while automated facility level operational boundaries are visually communicated, managed, documented, and evaluated using electronic map tools. Automated work control features improve the communication process and link to the hazard inventory of IOPS to reduce the time for planning and implementation of maintenance and construction activities. Feedback and performance mechanisms within IOPS get information back into the system, provide customer information to management in the completion of work, and close the loop in the process of "doing work safely".
- **Impact on cost reduction or avoidance:** Shadow costs related to "safety" in the laboratory are more readily identifiable. Identification of possible areas for cost improvement are part of the Integrated ES&H Management System goals for FY01.
- **Impact on reduced risk / increased compliance:** Requirements (as derived from SBMS) are more clearly defined and available "at the bench-top" with the deployment of IOPS. The ability to show how IOPS delivers compliance requirements has assisted in the reduction of bench-level compliance audits.
- **Impact on Intellectual Property:** IOPS continues to be a potential marketing opportunity that is being explored within the ES&H Product Line.
- **Impact on other National Labs and Battelle:** Interest in the IOPS concept and tool has been expressed by ORNL.

## Acquisition Management System Breakthrough Team

**Accomplishments:** The team presented its recommendations to the Leadership Team on March 14, 2000. In summary,

- The team was chartered with identifying methods to reduce the acquisition pool budget by \$400K and developing a recovery model for the pool.
- The team recommended centralizing the majority of the Contracts staff in one location, which could reduce the budget by \$400K by taking advantage of economies of scale and not replacing staff that had left. The Leadership Team approved the centralization effective October 1, 2000.
- The team recommended and the Leadership Team approved a recovery model that included the following points:
  - No new direct charge programs
  - 2% low rate for leases, P-Cards, and miscellaneous payments.
  - 6.5% high rate for all other acquisitions
  - Memorandum Purchase Order (MPO's) removed from Contracts Department.

### Impact/Benefits:

- **Impact/Benefits to R&D Staff:** Direct charge staff completely committed to one program will stay with client. For other clients, the Contracts staff will be less accessible but level of support should not diminish. Centralization of the Contracts staff will assist the Facilities Master Plan.
- **Impact on cost reduction or avoidance:** These recommendations will not require additional increases in the recovery rates.
- **Impact on reduced risk/increased compliance:** Compliance with the Acquisition Management System Policies and Procedures will improve.

## Electronic Records & Information Capture Architecture (ERICA) – Phase II

**Accomplishments:** ERICA Phase II accomplishments include:

- Improvements and refinements to the Information Release module implemented in ERICA Phase I
  - Release V2.0 of the Information Release module added electronic routing and approval based on client requirements and Division-specific requirements
  - Improved navigational tools and reporting functions of the Performance Measures & Metrics system (which is an integral part of the Information Release module)
- Customization of the Records Management module
  - TRIM by Tower Software is a DOD and DOE certified and approved records management application software that was customized to reflect PNNL roles and responsibilities and other client requirements. As customized, TRIM was approved by the Information Resources Change Control Board and implemented in the production environment.
  - A prototype web-based RIDS application was developed and reviewed by a team from the ERICA user's group.

### Impact/Benefits:

- **Impact/Benefits to R&D Staff:** Increased timeliness and efficiency by releasing scientific and technical information electronically to clients and the public. Electronic records in storage (TRIM) will be available at the desktop.
- **Impact on cost reduction or avoidance:** Electronic delivery and storage will result in soft savings to projects through a significant reduction in printing and distribution costs of client deliverables or publicly released information, and in cost avoidance to the Laboratory of storage of boxes of records.
- **Impact on reduced risk / increased compliance:** ERICA brings the Laboratory into compliance with client strategies to move from paper-based, centralized repositories to cost-effective distributed electronic access systems and will provide approved, protected storage of PNNL electronic records in compliance with Federal laws.
- **Impact on Intellectual Property:** When electronic Laboratory Record books (LRBs) become the standard for documenting intellectual property, ERICA will ensure appropriate access control and revision control.
- **Impact on other National Labs and Battelle:** ERICA, either in part or whole, will be available to other National Labs and Battelle. BMI has purchased the same records management software and we expect they will either share our system or their system and ERICA will be linked.

### Radiological Exposure REX Re-host

**Accomplishments:** The team reviewed, and modified, as needed, the requirements of the existing system. Existing data was migrated from a DB2 environment to an Oracle client server environment. New client software was developed. All server side software was rewritten or converted. Several weeks of testing were involved which included the cooperation of several different organizations within PNNL.

### Impact/Benefits:

- **Impact on cost reduction or avoidance:** All Hanford contractors will receive a benefit through reduced unit costs associated with dosimetry services, which the radiological records management function supports through the operation of the REX system.
- **Impact on other National Labs and Battelle:** Battelle will be able to provide a most cost effective Radiological Records program as part of the site wide services. This is achieved via a REX system that will now be hosted in an environment that is significantly more cost effective than the projected costs of the old system. Cost efficiencies are accomplished through lower machine costs, and a software environment that is easier to maintain and share data.

### Calibration Services

**Accomplishments:** The ETD's Instrumentation Services & Technology (IS&T) organization now provides a centralized function for the performance of in-house calibrations throughout the Laboratory. This was accomplished by combining the calibration functions previously maintained

by Facilities & Operations, Engineering Design & Craft Resources, and IS&T. Calibration records from both organizations have been combined and are now the responsibility of IS&T.

Calibration standards for temperature (temperature bath and a hand held temperature calibrator), humidity (dew point and relative humidity calibrators), and flow (a flow meter readout with 6 times better resolution than what was previously available at PNNL) have been obtained and placed into service.

#### **Impact/Benefits:**

- **Impact/Benefits to R&D Staff:** A centralized calibration function will simplify and reduce the turn-around time for the performance of selected calibrations. Increased capabilities will preclude the need for going to off-site calibration vendors for these types of calibrations. Consolidation of the two programs means that customers can now request a single calibration for instruments that have both a radiological calibration and an electronic calibration. In the past, the process for requesting and coordinating calibration of these instruments was complicated, as the customers had to schedule with two groups, and would receive two separate calibration reports, etc. The centralized calibration program provides for calibrations to be performed by full time calibration technicians and the more efficient use of calibration standards. Previous practice had calibrations performed by a relatively large number of technicians (having to coordinate the use of calibration standards) who performed other functions in addition to calibrations.
- **Impact on cost reduction or avoidance:** With improved internal calibration capabilities, the need to qualify external calibration vendors via audit has been reduced. The need to audit two internal organizations has been reduced by 50%. Providing increased internal calibration capabilities, should reduce the cost of calibration related requisition/purchase order costs. Cost savings should be able to be identified after the first quarter of FY01.
- **Impact on reduced risk / increased compliance:** By simplifying the calibration process and providing a single organization responsible for the performance of in-house calibrations, there should be an increase of compliance for the calibration of existing measuring and test equipment. A secondary benefit should be an increase in identifying those pieces of measuring and test equipment that will be calibrated. Additionally, minimizing delays in the performance of required calibrations reduces the potential for the use of out-of-calibration measuring and test equipment.
- **Impact on other National Labs and Battelle:** There is a possibility of future collaborations regarding calibration services and the exchange of information on calibration management systems.

#### **Safeguards and Security (SAS) Management System and Limited Area Island (LAI) Consolidation**

##### **Accomplishments:**

###### **Task 1 – Integrated SAS.**

All project goals were met. There were three primary areas that were addressed in this effort. The first area involved the organization of SAS. During this project, the most optimum SAS

staffing and organizational structure was identified and implemented in order to best support the needs of the line organizations. Several non-SAS functions were consolidated. This included Safeguards obtaining the Controlled Substances program.

An implementation plan addressing the suggested actions necessary for the continued integration of SAS into the line organizations was developed. All implementation plan items were completed as scheduled. This included the identification of SAS Field Representatives who were assigned to the primary Laboratory line organizations. The Field Representatives began working with the line organizations on a routine basis to aid in implementation and support of SAS requirements and processes as well as heighten awareness.

The SAS awareness program was enhanced with a new recognition program to acknowledge SAS awareness and initiate the promotion of a positive culture change. Additionally, a SAS newsletter was established, designed and published. Coordination with the Counterintelligence organization to provide threat awareness briefings for numerous line organizations was completed. And a customer feedback survey was developed and deployed in order to establish a baseline for SAS services across the Laboratory.

Another primary goal for this initiative was to identify and design systems for the delivery of SAS services. Several systems were either created and/or enhanced. This included the development of a notification query/report for SAS from the Electronic Prep and Risk system to ensure proposals/projects with SAS interests were captured and appropriate actions initiated. A Foreign Travel request and reporting system was also initiated.

The Proxcard request system was incorporated into the IOPs system in order to integrate SAS processes into existing Laboratory systems and make it easier for "customers" in the Laboratory to address all of their access needs. Coordination with the Radiochemical Processing Laboratory (RPL Building 325) Radioactive Material Tracking (RMT) resources was initiated in order to allow Safeguards to share data tracked on radioactive and nuclear materials within the RPL for NM accountability and reporting purposes. This system additionally assures the facility remains within all regulatory and facility limits.

The third primary goal was to revise related Laboratory procedures within SBMS to be more easily interpreted and deployed by the line organizations. Numerous Subject Areas were either created or replaced during this past fiscal year. Line organizations were heavily involved in their development and deployment. This included the development of standardized forms as well as defining the processes.

The Security Manual, MA-40, was sunset in accordance with the Laboratory schedule. The development of a "Program Description" to replace the MA-40 and to serve as a roadmap for our clients (primarily DOE) on how SAS is administered at the Laboratory was also completed. The Management System Description was modified and included coordination with Counterintelligence and the Export Control function.

#### Task 2 - Consolidated Limited Area Island

The physical construction to create the LAI boundary was completed during FY2000. The decision by the Leadership Team to delay the staff relocations into the LAI in EESB until Sigma II is leased has allowed for a structured staff relocation plan to be developed.

The overall goal of this task was to consolidate all desktop classified work into a single location, however there are two secondary goals associated with this task. The first of these two goals was to negotiate with the Sigma Corporation management to reach agreement to amortize the construction costs over the remaining 3-½ years on the lease. This negotiation was successful, however, agreement from DOE-RL to consider these additional lease costs as reimbursable had to be completed. DOE-RL agreed upon this and construction started in early summer. The modifications required to create the LAI on the 1<sup>st</sup> and 2<sup>nd</sup> floor of EESB went relatively well. Construction was completed the first part of August. This was very successful considering the multiple locations that had to be modified and the multiple staff that had to be relocated. The LAI was ready for activation, if needed, by the middle of August.

The secondary goal was to relocate the required staff within the LAI in EESB and then complete the back-fill plans to consolidate the Contracts organization into Sigma 3. The Leadership Team decision to lease Sigma II delayed the relocation of staff in order to more effectively and efficiently relocate staff and realign building profiles more consistent with the building mission. Due to extended negotiations with the Sigma II and Sigma IV building owners, relocation of staff into the LAI will not be completed until the 2<sup>nd</sup> quarter of FY 2001. This schedule is also pending the agreement on the loading of Sigma II and successful negotiations with the Sigma II building owner.

The LAI in EESB is ready to be activated and all agreements and arrangements are in place. Once the staff have been relocated during FY 2001, then the LAI can be activated and the overall goal set out for in FY2000 can be realized.

#### **Impact/Benefits:**

- **Impact/Benefits to R&D Staff:** No direct impacts. However, achieving compliance and reducing risk will contribute to increased business opportunities for R&D staff. Consolidation of the majority of classified “paper” activities into one facility is expected to provide an overall improvement in the SAS performance at the Laboratory in support of the projected business that involves classified work. There is a perceived benefit to staff that they will be able to conduct classified work within a single boundary, this reducing the risk of removing classified documents from the LAI. Also, there is a benefit to relocating the entry point of all classified work incoming or outgoing from 3760 to EESB.
- **Impact on cost reduction or avoidance:** This activity contributed to a minimal amount of “soft” savings that can not be directly quantified. Laboratory staff have quicker and user-friendlier processes to follow in order to accomplish their work (such as requesting approval for Foreign Travel, requesting changes to facility access, etc.). There is a cost savings with relocating the entry point from 3760 to EESB, which will greatly reduce the amount of time staff, have to travel to pick up or deliver documents.
- **Impact on reduced risk / increased compliance:** The primary impact this activity had for the Laboratory was on increased compliance, which will result in reduced risk. There had been an increasing number of non-compliance issues in the area of SAS that began to jeopardize the Laboratory’s ability to conduct work involving national security assets. By integrating SAS into the line organizations’ day to day activities and creating easier processes for them to follow, the risks associated with non-compliance should be minimized. By creating a more compliant system, continued business opportunities in the area of National Security are ensured. Integration of SAS resulting in increased compliance should positively contribute

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increased business in this area. Task 2 provides for the consolidation of the majority of classified "paper" activities into one facility and overall improvement in the SAS performance at the Laboratory. LAI consolidation will allow for the potential closure of the LAI in Sigma 3 and facilitate the future closure of the LAI in 3760. This consolidation of classified desktop work should have a positive impact on reducing the risk of violations relating to classified work. The transmitting of classified documents outside of the consolidated LAI will not be required with the single locations for all desktop classified work.

- **Impact on Intellectual Property:** No direct impacts other than improving the protection and control of intellectual property at the Laboratory.

### **Review and Documentation of Hazardous Chemicals used by Chemical Management System (CMS)**

**Accomplishments:** This initiative successfully reviewed the "parking lot" of chemical constituents in the CMS in order to identify potential chemical hazards held in PNNL inventory. This review identified some exceptions to the current Facility Use Agreement operating boundaries and the divisions are now working on reconciling these exceptions

**Impact/Benefits:** Briefly describe the benefits and positive impacts of the project in the 5 areas below. If you have no impacts in a particular area, just say "no impacts."

- **Impact/Benefits to R&D Staff:** This effort will help researchers work within the facility operating boundaries. There may be some initial effort to eliminate hazardous chemicals that are not used in research.
- **Impact on cost reduction or avoidance:** This effort was undertaken partly as the result of an Off Normal Event that was written because staff were not working within Facility operating boundaries. With the new classifications, there should be little question that we can demonstrate compliance with operating limits. This will reduce the cost associated with Off Normal Events, findings and observation from audits.
- **Impact on reduced risk/increased compliance:** This will increase compliance because PNNL is now more accurately aware of the hazard chemicals contained in inventory. By lowering the inventory of some of these hazardous chemicals, we are meeting the Uniform Building Code requirements for fire loading. In case of a fire, the hazardous chemicals will not have as large an impact as they might prior to the OII.
- **Impact on other National Laboratories and Battelle:** Other National Laboratories may use this data to conduct similar inventory checks at their own facilities.

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# **Appendix C**

## **External Oversight Activities Summary Report**

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Pacific Northwest National Laboratory

Independent Oversight Report

IO-2000-03

Evaluation of Fiscal Year 2000 External Oversight Activities of the  
Pacific Northwest National Laboratory

August 23, 2000

Prepared by: Original signed by JG Burr  
John G. Burr, Lead Evaluator  
Independent Oversight Department

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Date

Approved by: Original signed by JB Jaeger  
Jan B. Jaeger, Manager  
Independent Oversight Department

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Date

# Executive Summary

## Overall Conclusions

The general tenor of external oversight reports for Fiscal Year 2000 indicates that the Pacific Northwest National Laboratory (Pacific Northwest) continues to improve in almost all aspects of its operations. Progress has been noted by most external oversight agencies, and the overall performance of Pacific Northwest generally has been rated “Excellent” to “Outstanding.”

The depth, breadth, and number of external oversight activities have remained relatively constant over the past several years. There does not appear to be a formally organized external oversight effort and no one area of focus appears to dominate. There do not appear to be any significant adverse trends identified by external organizations that have not already been internally identified by the Laboratory’s Integrated Assessment Program (IAP).

## Strengths

- With the exception of facility representatives from the U.S. Department of Energy’s Richland Operations Office (RL), external oversight organizations are not finding trends that the Laboratory has not already identified in the IAP.
- The Assessment Tracking System is starting to be used more extensively for follow-up to external oversight reports.

## Areas for Improvement

- Analysis and trending of external oversight data need to be more formalized at the Laboratory level.
- External oversight data should be more systematically incorporated into organizational self-assessment program planning and execution.
- Line managers are not identifying Price-Anderson Amendments Act (PAAA) noncompliances in external oversight reports.
- RL facility representatives are identifying areas of noncompliance with conduct of operations that line managers should be finding through effective self-assessment.

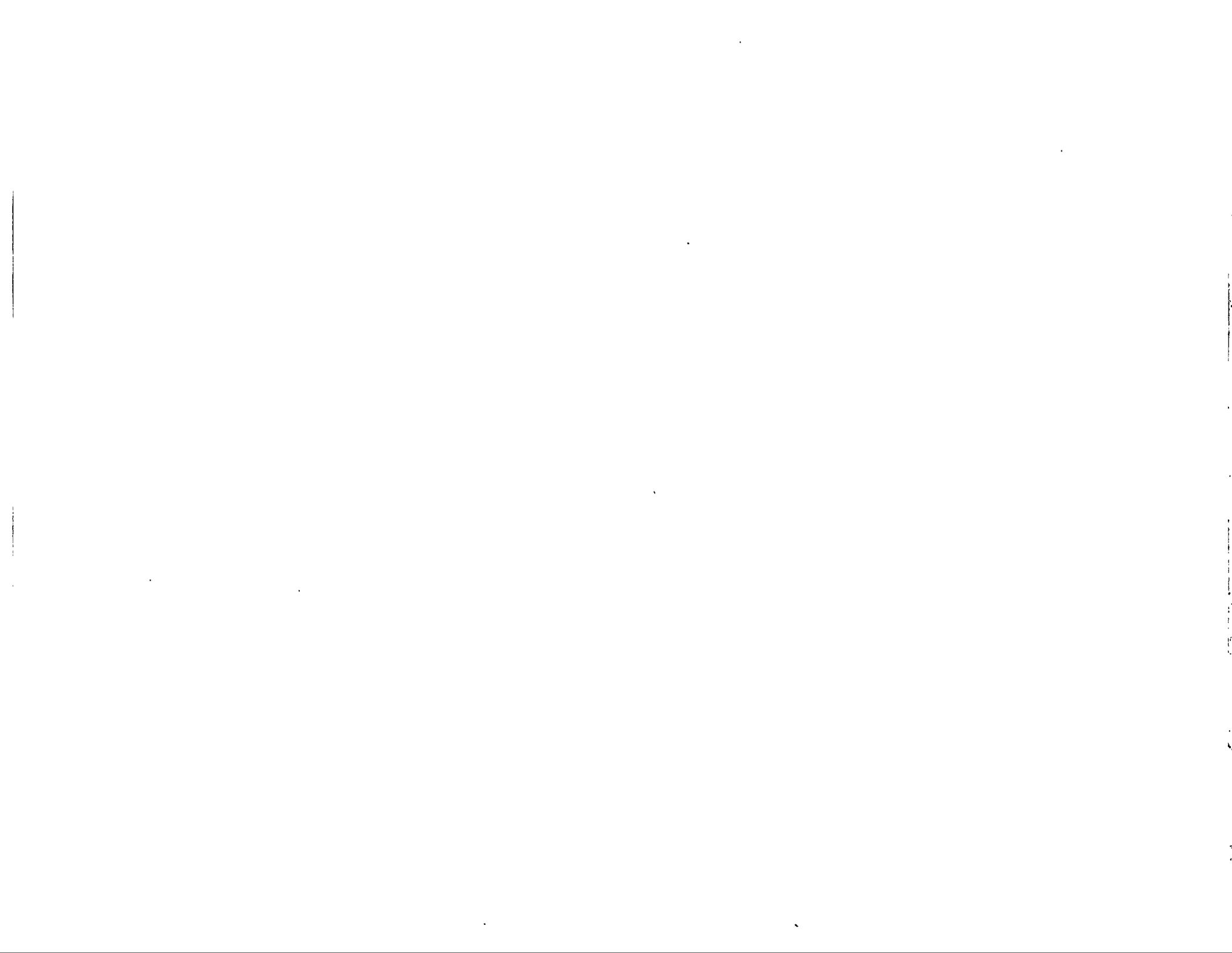
## Recommended Actions

- The Integrated Assessment management system owner should lead a Laboratory-wide effort to develop a more formal process for analysis and trending of external oversight data.
- Level 1 managers should more systematically incorporate external oversight data into the planning and execution of their organizational self-assessment programs.
- Line managers should develop internal processes to ensure that external oversight reports are systematically reviewed for PAAA noncompliances.
- Level 1 managers should enhance their self-assessment activities to provide objective evidence of compliance in the area of conduct of operations.

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# **Appendix D**

## **Survey Results of DOE-RL Satisfaction with Battelle Implementation of Self-Assessment Processes**



## DOE-RL's Satisfaction with the Implementation of Self-Assessment Processes at PNNL in FY 2000

FY2000 Laboratory-level Performance Indicator 3.1.2, was developed to provide evidence that PNNL leadership provides effective management systems to drive improvement, thereby enabling the DOE-RL to optimize oversight activities. PNNL's Self-Assessment process is used by line management as a tool to evaluate organizational health, drive efficacy of the Laboratory's Self-Assessment activities, and provide feedback to the Laboratory regarding opportunities for improvement. From DOE-RL's perspective, a strong Self-Assessment process can continuously improve products and processes as well as preclude unwarranted external oversight activity.

The annual DOE-RL satisfaction survey was conducted during August and September, 2000. This year, the survey population was considerably larger than FY1999 in an attempt to increase the validity of the responses. Fifty-five surveys were distributed electronically and 45 were returned resulting in a response rate of 82%, essentially unchanged from FY1999. Two new questions were added to this year's survey questionnaire to increase the scope of information to be gathered: (1) evaluation of alignment between a division's/directorate's performance goals and those of the Laboratory's, and (2) a solicitation for DOE-RL level of interest in taking training in self-assessment and business planning if it were offered. The level of interest in business planning was almost double that for self-assessment. This is encouraging as the Laboratory continues to combine business planning and self-assessment planning processes into an interactive and effective system. Table D.1 provides a detailed summary of comparisons for FY1998 through FY2000 in these areas and several others.

The results of the FY2000 survey are as follows:

Levels of satisfaction with the different aspects of the partnering relationship between DOE-RL and PNNL self-assessment Points of Contact continue to achieve or approach an Excellent rating. In comparison to FY1999 survey results, there are no statistically significant differences, and *frequency of interactions* and *having needs/expectations considered* continue to receive the highest satisfaction ratings. It should be pointed out, however, that for all survey questions on satisfaction, the number of Unsatisfactory and Marginal ratings has decreased from a total of 19 in FY1999 to 4 in FY2000, almost a 500% decrease. Equally encouraging is the fact that in FY2000 there were no Unsatisfactory ratings.

Among our DOE-RL counterparts, satisfaction with their overall level of involvement in self-assessment activities, and with Battelle's use of assessment results to effect improvement, continues a positive 3-year trend. In both cases, these indicators continue to achieve or approach an Excellent rating. Figure D.1, *DOE-RL's Satisfaction with Their Overall Level of Involvement in Battelle Assessment Processes*, and Figure D.2, *DOE-RL's Satisfaction with PNNL's Use of Assessment Results to Effect Improvement*, show comparisons in these areas for FY1998 through FY2000.

Table D.1. Overall Summary of Results DOE-RL Satisfaction Survey FY1998, FY1999, FY00

Area	FY1998	FY1999	FY2000
Survey population		31	55
Survey response rate	43%	81%	82%
DOE-RL satisfaction with overall level of involvement in Battelle's self-assessment processes	Satisfied or better Target: Positive trend Result: 88%	Satisfied or better Target: Positive trend Result: 87% Average rating: 3.0	Satisfied or better Target: Positive trend Result: 93% Average rating 3.56
DOE-RL level of understanding of self-assessment processes	Adequate or better Target: Positive trend Result: 88%	Good or better Target: Positive trend Result: 91%	Good or better Target: Positive trend Result: 94%
DOE-RL degree of interest in taking training in self-assessment, integrated assessment, and business planning	N/A This question did not appear in the FY1998 survey questionnaire	N/A This question did not appear in the FY1999 survey questionnaire	Interest level Target: Baseline Result: 47% overall Business Planning 92% Self-Assessment 58%
DOE-RL satisfaction with Battelle's use of assessment results to effect improvement	Satisfied or better Target: 90% Result: 77%	Satisfied or better Target: 90% Result: 91% Average rating: 3.6	Excellent to Outstanding Target: 75% Result: 85% Average rating: 3.95
DOE-RL evaluation of degree of alignment between Battelle's self-assessment performance measures and the Laboratory's strategic goals	N/A This question did not appear in the FY1998 survey questionnaire	N/A This question did not appear in the FY1999 survey questionnaire	Excellent to Outstanding Target: Baseline Result: 90%
Highest levels of satisfaction among DOE-RL counterparts*		Frequency of interactions 4.5 Needs/expectations considered 3.6	Frequency of interactions 4.2 Needs/expectations considered 3.78
Lowest levels of satisfaction among DOE-RL counterparts*		Input solicited and acknowledged 3.4 Regularity of interactions 3.6	Regularity of interactions 3.6 Input solicited and acknowledged 3.76
Areas of greatest improvement per DOE-RL counterparts			Overall involvement +6% Use of assmnt results +4%
<b>Satisfaction Ratings: (FY1999 and FY2000)</b>	1 = Unsatisfactory 4 = Excellent	2 = Marginal 5 = Outstanding	3 = Good

FY 2000 represents a significant shift in the approach to analysis of survey results. Whereas the approach of the previous approach was, for the most part, to present amalgamated data (overall averages, etc.), FY 2000 departs from that approach. In keeping with our stated intentions to share survey results, including comments, with individual divisions and directorates within the Lab, the results in this report (see Tables D.2 and D.3) are reported in terms of comparisons among individual organizations. It will quickly be seen, that in most cases results among organizations do not differ to any statistically significant degree. What is important this year is the intended use of this year's survey results to improve our relationships with our DOE-RL self-assessment counterparts on an individual basis, working together to achieve improvements in specific areas and acknowledging success where we have achieved it.

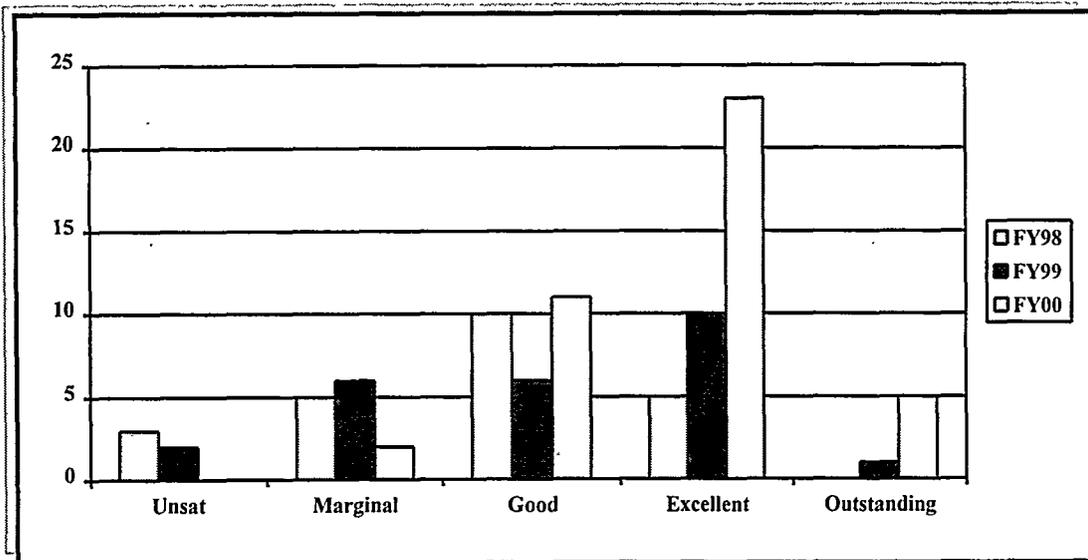


Figure D.1. DOE-RL's Satisfaction with Their Overall Level of Involvement in PNNL's Assessment Processes

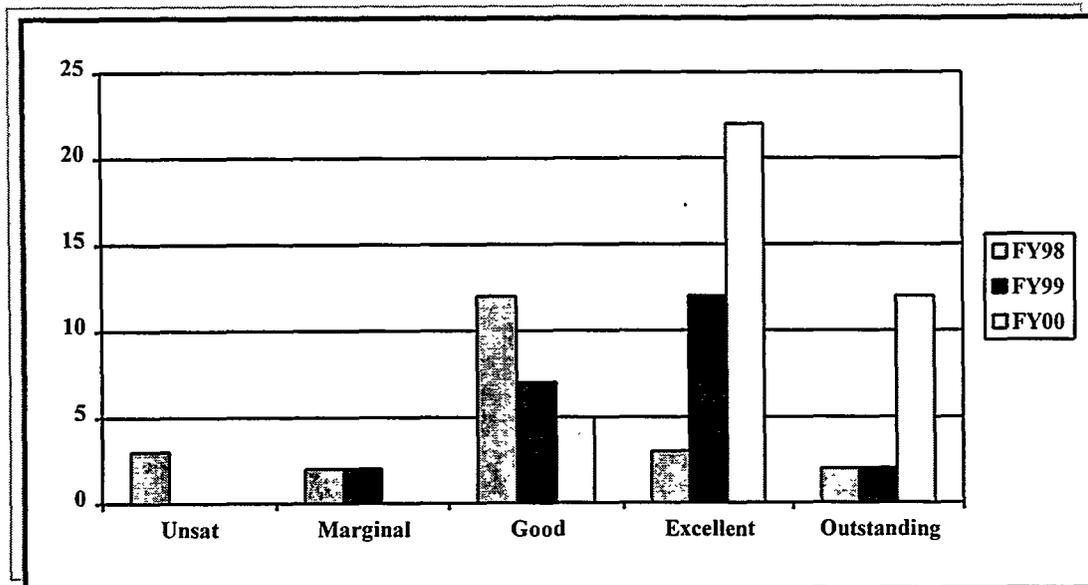


Figure D.2. DOE-RL's Satisfaction with PNNL's Use of Assessment Results to Effect Improvement



## Summary of Comments from DOE-RL Survey Respondents:

In all, 17 DOE-RL survey respondents provided a total of 27 separate comments, which when broken down, resulted in 33 statements. Three of these statements were neutral, essentially explanations of why involvement was so meager (newly appointed POCs) and one was a suggestion on a system refinement. When analyzed, the comments fell into three main categories: 1) interactions between DOE-RL and their PNNL counterparts, 2) the health of the PNNL counterpart's management system, and 3) the questionnaire used to conduct this survey.

**Interactions:** As can be seen in Figure D.3, *Summary of Comments Made by DOE-RL Survey Respondents*, comments made by DOE-RL counterparts regarding their interactions with PNNL Points of Contact were very positive. The four negatives are unanimous in their desire for increased regularity of communication with their PNNL counterparts so that they can be more involved in self-assessment activities. All four of these respondents give very high marks to the quality of their relationship with their PNNL counterpart, and for the representative management systems. Given the overall cordiality of relationships, the potential for working this problem through to a satisfactory resolution is very promising.

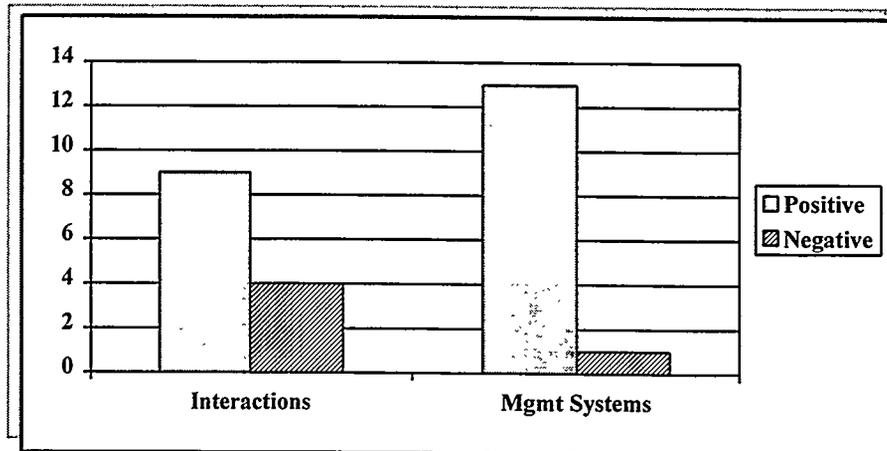


Figure D.3. Distribution of Comments Made by DOE-RL Survey Respondents

**Management Systems:** All comments made regarding the quality of the Laboratory's management systems were highly complimentary, with one exception (see Figure D.3, above). One respondent felt that of the three management systems he was evaluating, one of them had lost ground this past year based on the level of planning and system definition observed. This is an area that warrants further scrutiny.

**Survey Questionnaire:** Two survey respondents were unsatisfied with the survey questionnaire. One respondent felt that the survey "put a negative spin on things." The other respondent felt that the choice of responses was inadequate, and that the survey was remiss in not addressing the Integrated Safety Management System. It is our intention to work with these two individuals to improve the survey questionnaire for FY2001. This feedback is very valuable to further continuous improvement in gathering information from our primary customer.

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**Conclusions:** The Laboratory's use of assessment results to drive improvement has received an Outstanding rating from its DOE-RL counterparts. Relationships between DOE-RL and PNNL self-assessment counterparts continue to improve, and on average are achieving an Excellent rating among Laboratory divisions, and are on their way to achieving an overall Excellent rating among the directorates. Individual comments from our DOE-RL customers display a high level of interest in the health of PNNL's self-assessment processes, are very positive in nature, and also provide some suggestions for further improvements that the Laboratory will follow up on during FY2001.